Vol. 49 No. 4 April 1956

C. J. Babrock

Quarterly

of the

National Fire Protection Association

INTERNATIONAL

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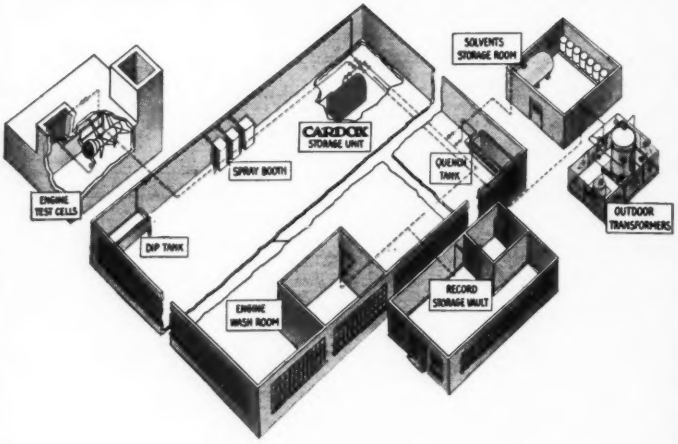

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Vol. 49 No. 4 April 1956

Quarterly

The Standard Technical Journal of Fire Protection for More Than Forty Years

The NFPA is a non-profit technical and educational organization devoted to the reduction of loss of life and property by fire with a total membership of over 16,000. The *Quarterly* is one of the publications regularly provided to members. Other membership publications include *Fire News, Advance Reports* to the Annual Meeting, a *Year Book,* and many leaflets, pamphlets and posters issued throughout the year on fire prevention and control. Six volumes of the National Fire Codes are available on an annual subscription basis, one volume free and others at reduced membership rates. For full details on available material ask for the free "List of NFPA Publications."

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Quarterly

of the

NATIONAL FIRE PROTECTION ASSOCIATION

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Accounts of fires appearing in the Quarterly are based on reports forwarded to the Association except where otherwise indicated. The Association, as a body, does not assume responsibility for the accuracy of the fire reports printed herein.

This publication is indexed by Engineering Index, Inc.

"In the crash fire field, we seem to have already largely run out of capability . . ." The truth of this statement by NFPA General Manager Bugbee in an "Open Letter to the Aviation Industry on Fire Safety," dated January 25, 1956, is proved by fires such as this one at Dow Air Force Base, Maine. Forty-three fire fighters with multiple crash trucks could not control this fire involving a KC-97 "Flying Tanker" and had to lay 1,500 feet of 2½-inch hose and use 2,000 pounds of foam powder to accomplish extinguishment. All 12 crew members escaped.

Church Oyster Roast Fire Panic

By Richard E. Stevens
NFPA Fire Record Department

"There is a small fire here at Arundel Park, will you send down a fire truck?" This was the nature of the telephone message received at 5:08 P.M. Sunday, January 29 at the Brooklyn, Maryland fire station. The alarm was sounded and three trucks dispatched to the amusement hall. When the fire fighters arrived, they found people milling everywhere, some critically burned, some injured and some suffering from shock. A general alarm was sounded immediately. Primary attention was given to the burned and injured, but hose streams were also quickly directed into the building. When the fire was cooled enough for firemen to enter the building, ten badly burned bodies were found together near one end of the building about 20 feet from an exit. One man was critically burned and died in the hospital about a week after the fire. A church sponsored "oyster roast" in a rented amusement hall thus ended in tragedy.

The three major factors responsible for the loss of life were: (1) failure to evacuate the building on detection of fire or to call the fire department immediately; (2) combustible concealed attic; and (3) panic following failure of lights. These and other contributing factors are discussed in the conclusions of this article.

Note: The Author wishes to express his sincere appreciation to the following men for their excellent cooperation and assistance in obtaining details on this fire: John Hevener, Chief Building Inspector, Anne Arundel County; Harry Klasmeirer, Chief, Fire Prevention Bureau, Anne Arundel County; Louis Maisel, Chief, Fire Prevention Bureau, Baltimore County; John J. Meyers, representing the State Fire Marshal's Office; Joseph Neill, Chief, Brooklyn Fire Department; Detective Sergeant Thomas Smith, Maryland State Police; and Wilbur C. Wade, Chief, Anne Arundel County Police Department.

Arundel Park Corporation owned and operated Arundel Park, a building housing a milk bar, cocktail lounge and a large (80 ft. by 160 ft.) hall which was rented almost every night to organizations running "bingo" parties, oyster roasts and similar events. At such events the milk bar and cocktail lounge were closed off from the main hall to prevent non-paying guests from entering the hall by other than the main entrance. Arundel Park is on Belle Grove Road (Route 170) about one mile from Baltimore city limits.

Building Construction

The main building (see Figure 1) was originally constructed as a roller skating rink. The floor was concrete, the 12-foot-high walls were concrete block, and the arch-type roof was constructed of wood sheathing on wood trusses with five layers of built-up felt. Windows were of the industrial type with steel frame and extra heavy glass lights.

In later years, sections of similar construction but with flat roofs, were added from time to time. These included a cocktail lounge added to the west side of the building, a kitchen to the south rear corner, and a milk bar, office and storage room to the east side. Windows in the new sections were of the same size as in the original building, but the sills were about 3 feet from the floor.

Sometime ago, combustible fibreboard was nailed on strapping attached to wood joists below the roof. Installation of the ceiling resulted in an undivided combustible concealed attic. Other than the fibreboard ceiling, which had been painted on the underside, there was no other significant quantity of combustible interior fin-

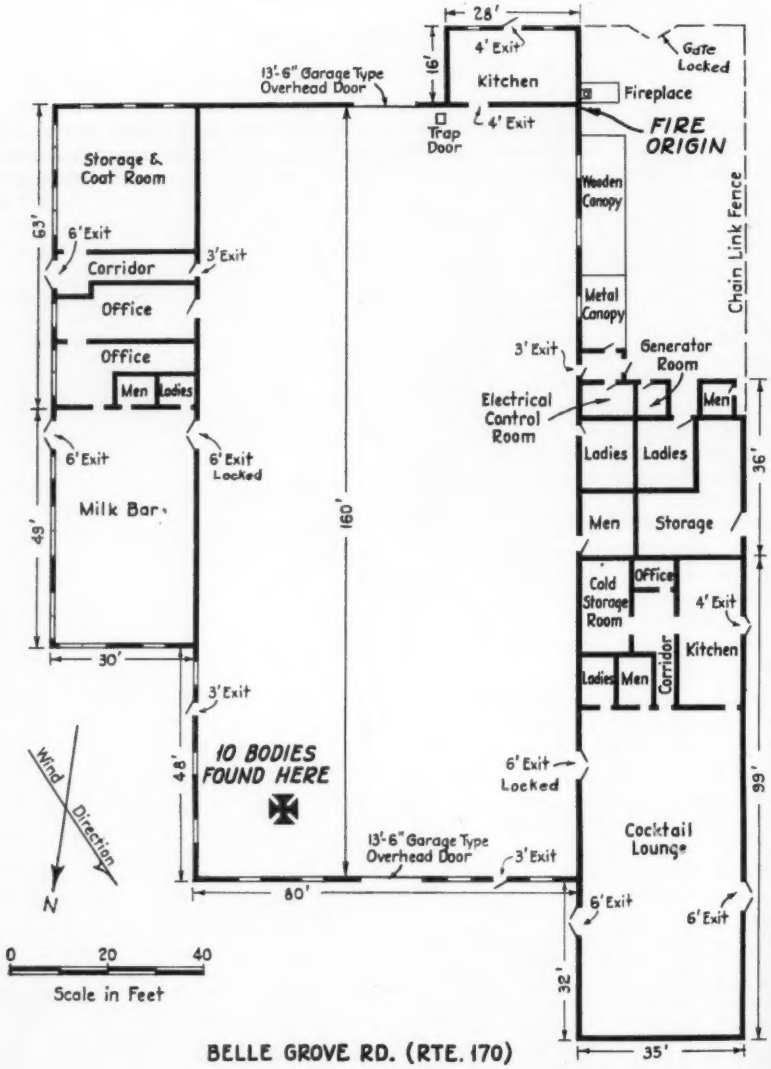
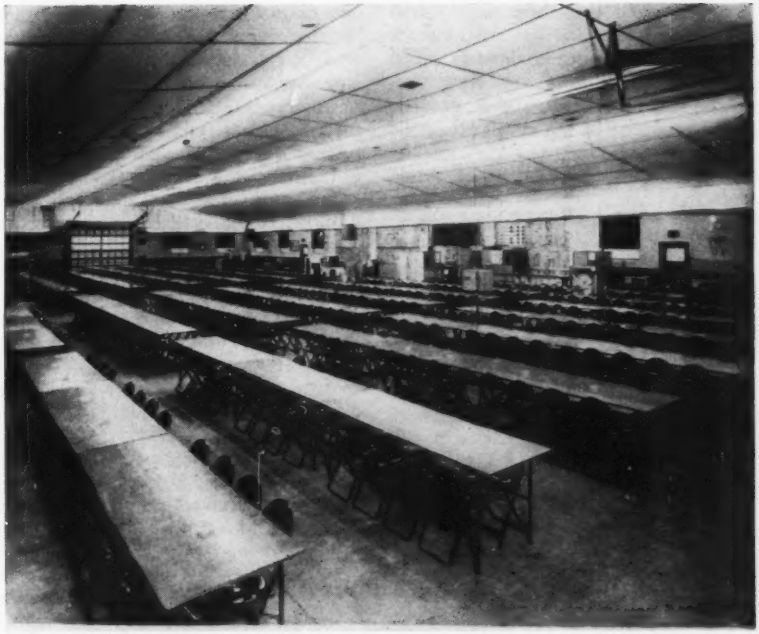


Figure 1. Floor plan. Windows in the cocktail lounge could not be located on the plan because the walls of the lounge had been pulled down after the fire.



This view was taken from the rear of the main hall looking towards the front of the building. The photo was taken before the cocktail lounge, milk bar, offices and storage sections were added. The setup shown accommodates about 770 people whereas the room must have been much more congested as there were accommodations for 280 additional people, a bandstand, dance floor, game and beverage tables, etc.

ish. Walls were concrete block and only minor quantities of pine paneling were used in a few places for finishing.

The attic space was insulated with paper-covered batts of mineral wool laid on top of the fibreboard ceiling.

Conditions Prior to Fire

Sunday afternoon, January 29, 1956 the hall was rented to St. Rose of Lima Catholic Church for an oyster roast. About 1,200 tickets had been sold for the Church Benefit.

Four tables were distributed around the edges of the hall for the sale of beer, one table for "money wheels" and one table for prizes for winners at the "money wheels." Several slot machines were also distributed throughout the hall. The money wheels and slot machines were owned and operated by the building owners.

A small bandstand was set up between the doors to the lavatories (see Figure 1) and the area directly in front of the bandstand was open for dancing. The remainder of the hall was set up with wooden tables about 3 feet wide placed parallel to the long sides of the hall and with sufficient steel folding chairs to seat all guests.*

*The setup within the building as cited above has not at the time of this writing been definitely established but is based upon statements of employees who had experience with similar oyster roasts and from evidence in the ruins. (See photo above for typical setup.)

It is estimated that there were 1,050 people present in addition to 50 church workers—a total of approximately 1,100 people, which would indicate very crowded conditions and lack of adequate aisle space as measured by the standards of the Building Exits Code.

It is reported that the exit to the milk bar and the one to the cocktail lounge were locked at the time of the fire.

At about 5:00 P.M. several men were shucking oysters under the wooden canopy outside. One man was cooking oysters on the fireplace (see photo below). It was practically dark outside since it was a cloudy, foggy day. The lights were on in the building. Several couples were dancing to the tunes of a small orchestra. Temperature outside was 38°F. and the wind blowing 5 mph from the southeast.

The Fire

Although the statements of witnesses vary, it appears that fire was first seen outside under the eaves of the roof near the chimney of the fireplace where oysters were being cooked. Men in the area used a garden hose in an attempt to extinguish the flames. A ladder was obtained and the garden hose taken up the ladder in a further attempt to extinguish the fire. But fire spread up the roof, and unknown to the outsiders, apparently spread into the concealed space between the combustible fibreboard ceiling and the roof. Meanwhile people inside the building saw smoke and fire coming from between the ceiling and the wall in the corner of the hall near the kitchen. One man took a carbon dioxide extinguisher and discharged it briefly at the fire. The flame disappeared momentarily. The owner then summoned an employee to obtain a stepladder and suggested that another employee call the fire department. The alarm was received at fire headquarters at 5:08 P. M.

Using the stepladder, an employee climbed to a trap door in the ceiling (see

Evening Sun

This photo was taken from the rear south corner of the building. Note the fireplace for roasting oysters at the extreme right of the picture. It was near here at eave height that the fire was first noted.

Figure 1). When he looked into the attic space, fire seemed to involve the whole area. The door was quickly closed and the owner motioned to employees to clear the hall. Some occupants, recognizing the danger, stood up to leave and had started towards exits when a "swoosh" was heard and fire and smoke came through the ceiling in several places simultaneously. Where complacency had existed a few seconds earlier, fear now reigned. All thoughts were directed towards getting out of the building. Undoubtedly confusion was heightened by the general clutter of tables and chairs. Fathers made vain attempts to gather their families before leaving the building. Then the lights went out and panic ensued. Stories of the savageness as well as of the heroism of the occupants were reported in newspaper accounts.

The locked exits were apparently broken open because all the exits were used. Both garage-type doors were eventually opened but with difficulty and some delay probably because of lack of knowledge of the proper operation of the doors and the push of the crowd against them. Many people broke the windows and climbed or were pushed through the lower panes (13 in. by 28 in.). Those who escaped through the exit leading to the fenced enclosure on the south side of the building had to break the lock on the enclosure gate.

When firemen arrived a general alarm was immediately radioed. In addition to the well involved ceiling in the interior of the building, fire was spreading up the exterior rear wooden wall over the flat roof of the kitchen. Some firemen brought hose lines to the blaze from the private yard hydrant. Others directed their efforts to assisting the critically burned and injured people. First reports indicated that many occupants were trapped in the lavatories. This report later proved to be false. When firemen were able to enter the building two hours later, ten bodies were found together on the floor about halfway between the front garage-type door and the side 3 foot exit (see Figure 1). All of the bodies found were women ranging in age from 28 to 82. Witnesses state that at least one of the trapped women had gone back into the building in an effort to save a relative. Newspaper estimates of the injured range as high as 250. Newspapers also stated that as many as 140 were listed as receiving treatment in hospitals, fourteen of whom were held for admission. One man died in the hospital on Saturday, February 4. The estimated property loss to the building and contents is $150,000.

Fire Fighting and Rescue

The first truck dispatched from fire headquarters approached the building from the rear. Seeing the extent of the blaze, firemen made a "hydrant-to-fire" hose lay using 1,000 feet of 2½-inch hose from a private hydrant to the front of the building. Later a second 2½-inch line was connected to the same hydrant.

The men on the second and third trucks did what they could to make the burned and injured people comfortable. When apparatus responded from Linthicum, Ferndale, and Glen Burnie (all included in the first call as part of the 5th District of Anne Arundel County) Chief Joe Neill of Brooklyn Fire Department directed them to a street hydrant about 5 blocks away and to pits full of water across the street that had been dug in connection with some construction work. A relay was set up from the street hydrant and pumpers drafted directly from the pits. Several 2½-inch lines were wyed into two 1½-inch lines for more coverage and easier handling. The many injured and burned people around the building and the number of parked cars made accessibility to the burning building difficult.

Doctors and ambulances were summoned soon after the mutual aid call. Rescue squads from six nearby towns responded. About 30 pieces of fire apparatus from many surrounding com-

Evening Sun

Taken from the rear southeast corner, this photo shows the main entrance, the entrance to the milk bar (extreme right) and the rear garage-type door (extreme left).

munities answered the general alarm. Some of these were used for standby, but a great many of the firemen assisted in administering first aid to the injured.

Help was offered from three county fire associations and two nearby Army units.

Congestion caused by curious bystanders created a considerable traffic problem, greatly hindering fire fighting and ambulances shuttling from nearby hospitals.

Cause of Fire

The cause of the fatal blaze may never be determined. One neighbor stated that he saw sparks rising from the fireplace that could have lodged in the eaves or under the wooden canopy. There was a large piece of steel lying on top of the fireplace, but continued heat had curled the edges sufficiently to allow ample room for sparks to escape.

Both inside and outside of the building there were several other ignition potentialities in the immediate area where the fire was first noted such as: the fluorescent lighting fixtures attached directly to the fibreboard ceiling, the gas-fired unit heater suspended from the roof and directly below the ceiling, and a transformer for the neon tube that was attached to the outside of the building just under the eaves. Any one of these installations could have been responsible for the fire origin, although the fact that the fire apparently originated outside indicates that the sparks from the fireplace or the neon tube transformer were the most probable ignition sources.

Details of Building Features

Ceiling Construction

The fibreboard ceiling (4 ft. by 8 ft. panels) was nailed to strapping attached to 2 in. by 6 in. joists. Starting from the plate, the joists followed the roof contour up to a height of 18 feet from the floor, then were suspended parallel to the floor at the 18 foot height until they met the roof on the opposite side and again followed the roof contour down to the plate. This installation resulted in the interior effect shown in the picture on page 279.

Windows

There were eight lights in each of the larger windows. The two upper and lower lights were 13 in. by 28 in.; the four middle lights 15 in. by 28 in. The lower section of the sash was hinged to open outward from the top 6 to 8 inches. The center section opened at the bottom and was hinged in the middle. Sills of the windows were 5 feet 2 inches from the floor.

Outside Fireplace

The outside fireplace venting to a chimney on the side of the building was used for oyster roasting and as an incinerator. When used for oyster roasts, the fireplace was apparently wood fired. A wooden and a metal canopy were attached to the rear wall of the building, under which oysters were shucked. This area containing the fireplace, canopies and a general picnic area was bounded on the south and west sides (see plan layout, Figure 1) by a chain link fence topped with several strands of barbed wire, and on the north and east sides by the building. A double hung gate at the east end of the enclosure was reported to have been locked at the time of the fire.

Exits and Doors

The main hall had three 3 foot exits leading directly outside, one 3 foot exit leading to the main entrance (a 6 foot double exterior door), and two 6 foot exits, one leading outside through the milk bar, and the other through the cocktail lounge. All doors were wooden and were equipped with panic hardware. In addition there was a 4 foot door leading directly outside from the attached kitchen. Although it was difficult to determine from the remains of the building, apparently most of the exits were marked. The exit lights were on circuits integral with the main lighting circuits.

There were also two 13 ft. 6 in. wide by 12 ft. high garage-type, wood paneled, overhead doors, manually operated on tracks and spring loaded, one on each end of the main hall. (See diagram Figure 1.) These doors are not considered as emergency exits by the NFPA Building Exits Code.

Heating

The entire building was heated by gas-fired unit heaters suspended from the roof. Each heater was equipped with a vent to the outside and appeared to have satisfactory limit controls and other safety features. There were six such heaters in the main hall; one in each corner and one about halfway down each side. The main 3-inch gas riser entered the building near the kitchen door with take-offs to the kitchen and divided under the roof into two 2-inch lines that ran the full length of the building with take-offs to the unit heaters.

Wiring and Lighting

All wiring was metal sheathed cable and was installed in the roof space. Electrical switches and controls were installed on a panel board mounted on the masonry wall of the lavatory closest to the east exterior wall of the milk bar. The service entrance electrical switches and controls were in a small wooden lean-to on the west wall of the hall (see Figure 1). An auxiliary generator was installed in a wooden enclosure beside the electrical lean-to to provide power for the building in the event public electric service failed. On the outside of the building a continuous single neon tube was installed at the eaves. Numerous transformers for these neon lights were spaced at various points around the outside of the building. Interior lighting was supplied by several rows of continuous line-type fluorescent fixtures attached to the underside of the fibreboard ceiling.

Ventilators

In the ceiling of the hall were several ventilators with louvres manually operated by chain pulls. Each ventilator opened directly into the concealed attic space. Louvres found in the ruins were closed and it is believed that all the louvres were closed at the time of the fire. There were

Baltimore News-Post

Ambulances backed up to the front garage-type door to carry away bodies.

also four open ventilator ducts leading from the concealed attic space through the roof and terminating in rotary siphoning devices. On each end of the building in the concealed attic space there was a 48-inch louvre with two fans installed in it. There were also ventilating fans installed below the ceiling on each end of the building above the garage-type doors. All of these ventilators exhausted directly outside.

None of the ventilating fans in the attic were operating at the time of the fire. One of the fans below the ceiling is believed to have been operating, but it has not been determined which of the two it may have been.

Fire Protection

There was no automatic fire protection installed in the building. A recent survey of the property indicated that there were ten 25-pound carbon dioxide and two 2½-gallon soda and acid extinguishers distributed throughout the building.

A standpipe hose was installed on the wall between the doors to the lavatories off the main hall. Investigation after the fire revealed that the valve handle was missing.

A private hydrant on a 6-inch main was located about 300 feet south of the building.

Public protection was provided by the Brooklyn Volunteer Fire Department, although first alarms in Brooklyn also summoned equipment from Ferndale, Glen Burnie, and Linthicum.

Local Codes

As far as can be determined, the building met the requirements of the local building code for places of public assembly. The property had been inspected recently by the Chief of the Fire Prevention Bureau of Anne Arundel County and met the requirements of that department.

Conclusions

The fire protection weaknesses and the contributing factors that resulted in the loss of life in this fire are discussed in

the following paragraphs. They have been arranged, in the opinion of the writer, in the order of their importance as they pertain to the cause of the loss of life. Specific variances with the provisions of the Building Exits Code, NFPA No. 101, are cited because the objective of this Code is to prevent occurrences like the one described in this article.

1. *Delay in evacuation and alarm transmission.* Failure to evacuate the building on detection of fire or to call the fire department was the primary cause of the loss of life. Evidence indicates that when the fire was first noticed on the exterior of the building it was fought for some time and even after it was observed inside, the building was not immediately evacuated or the fire department notified. It has been established that approximately 8 minutes elapsed between the time the fire was first seen and the evacuation of the building began.

2. *Combustible concealed attic.* The presence of the combustible concealed attic allowed fire to reach major proportions in a short period of time. When fire and smoke came through the ceiling, it did so simultaneously in several places and this fact undoubtedly contributed to the panic and ultimately to the loss of life. An automatic sprinkler system installed in the concealed space could have extinguished the fire in the attic in its incipient stages. A fire-department-connected automatic fire detection system would have provided early detection and facilitated early extinguishment. Draft stops and roof vents might have confined the fire to its area of origin long enough for complete evacuation of the building.

3. *Panic.* Resulting panic, much of which may be attributed to the fire and smoke, failure of the lighting system, and the congestion of the hall with the loose chairs and tables, was certainly a major factor in the loss of life. It is also probable that the actions of some of the occupants, perhaps best described by one newspaper in a quotation that some "men behaved like beasts," were influenced by the consumption of enough beer to cause them to act more savage than if they had been sober.

4. *Failure of current supply to exit signs.* The failure of the lighting system and concurrently the lights for the exit signs was undoubtedly a factor in the panic that resulted in this fire. The Building Exits Code requires that the emergency lighting (exit signs) shall be from a source independent of that for the general lighting or shall be controlled by an automatic device which will operate reliably to switch the circuit to an independent secondary source in the event of failure of the primary source of current.

5. *Congestion of materials in the hall.* Sufficient tables and chairs to accommodate 1,050 people in addition to a bandstand, a space for dancing, four beer tables, and two tables for money wheels and prizes would require the tables to be relatively close together and result in considerable congestion. If sufficient aisles were not provided and access to exits was impeded, panic and general confusion would have been further intensified.

6. *Lack of fire alarm system and employee training in fire emergencies.* The Building Exits Code specifies training of employees in the duties they should perform in case of fire, panic or other emergency in order to be of greatest service in effecting orderly exit of assemblages. Investigation revealed that several men were hired by the owner to work at Arundel Park when the hall was rented for events such as oyster roasts. There was no evidence that any of these men were instructed in what to do in case of emergency or that there was any preplanned course of action to be taken by any employees in case of fire.

Large Loss Fires of 1955 – Summary

An NFPA Staff Study

There were 316 fires in the United States and Canada during 1955 with individual losses of at least $250,000. Of these, 61 involved losses of $1,000,000 or more. Corresponding figures for 1954, the worst "large loss" year prior to 1955, were 313 fires and 44 million-dollar losses. The total loss of $267,704,500 was exceeded only by the $274,374,500 loss of 1953, the year in which one industrial fire involved a $45,000,000 loss.

In these large loss fires, there were 296 deaths (includes 254 aircraft fire fatalities), and 615 injuries (nonfatal aircraft injuries not included).

The 316 large loss fires accounted for about 24.5 per cent of the total fire loss in the United States and Canada during 1955. Because of this effect of large loss fires on the over-all fire waste total, and also because of the many inevitable indirect losses which cannot be accurately measured in dollars, these 316 largest fires of 1955 have been carefully analyzed. The results have been published in this issue of the QUARTERLY so that the lessons of these fire disasters may be easily recognized by those responsible for the application of sound fire prevention and protection principles.

In order to present the results of this study in a useful form the fires have been grouped into ten classifications (see Table of Contents). A discussion of the significant factors responsible for the fire experience in each classification is presented and, except for the 69 aircraft fires, individual fire reports have been included. Because of the specialized nature of the aircraft fires the individual fire reports have been published in an NFPA Aviation Bulletin.*

*NFPA Aviation Bulletin No. 142. Available from the NFPA for $2.00 a copy.

Efforts have been made to obtain accurate information on the 316 fires. We are indebted to city, state and provincial fire officials, insurance organizations and many individual members for the reports that form the basis of this study.

No. of Large Loss Fires by Years

	1955	1954	1953	1952	1951
Manufacturing	78	75	105	88	99
Storage	41	54	48	44	50
Mercantile	50	54	29	38	49
Transportation	70	57	39	48	36
Residential	9	11	11	13	8
Miscellaneous	68	62	61	44	60
Totals	316	313	293	275	302

Geographical Distribution

Two hundred and twenty-four of the large loss fires occurred in the United States, 22 in Canada. States with the greatest numbers were Pennsylvania with 27, California 20, New York 15, New Jersey 12, Michigan 11, Illinois and Massachusetts 10 each. In Canada, the Province of Quebec had 10 large loss fires, Ontario 5. Transportation fires are not included in this geographical summary.

Construction Features

Past studies of fires have shown that large losses usually can be prevented by structurally limiting the area through which a fire may spread. Construction weaknesses have always played a prominent role in the large loss fire experience and the 1955 experience was no exception. Of the 225 fires that occurred in buildings, structural fire protection weaknesses played a significant part in the extent of damage in 200 instances. In these 200 building fires one or more of the substandard fire protection features of the buildings enumerated in the following paragraphs contributed to fire spread.

Division walls are a major structural device for limiting fire spread. The absence of a division wall (instances where good judgment would have recommended subdivision) was noted in 121 fires.

There were 26 instances of substandard division walls (e.g. did not extend through roof, low fire-resistance rating, etc.), 17 instances of unprotected doorways in division walls, five of fire doors blocked open and five in which conveyor openings were not protected.

In the 153 buildings of more than one story (including 22 one-story buildings with basement) fire spread beyond the story of origin in 78 cases because of 67 open stairwells, 43 open elevator shafts, 21 nonfirestopped walls and seven openings around pipes.

Other frequently recorded structural features contributing to the extent of fire were combustible fibreboard (13), other combustible interior finish (5) and combustible insulation (3).

Fifty-eight fires spread from the building of origin to exposed buildings for one or more of the following reasons: 31 cases of combustible buildings without intervening fire walls, outside sprinkler protection or adequate separation of buildings; 14 cases of poorly constructed party walls; 13 interconnecting passageways; nine ordinary glass windows; eight yard storage, and three grass and trash between buildings.

Fire Detection and Alarm

Provision of means for prompt fire detection is a vital part of a program to prevent large loss fires. Last year discovery of the fire was delayed in 163 instances. In most of these (119) delay occurred because the buildings were not in operation (closed for the night or week end) and had been left without watchman or automatic fire protection during nonoperating periods. There were, however, 30 instances where substandard watchman protection was responsible for delayed discovery. Only two properties were protected by central-station-supervised automatic fire detection systems. One system apparently detected the fire and transmitted the alarm without appreciable delay (department store warehouse, Lansing, Mich.) but because of the combustibility of the contents, storage methods and lack of sprinklers the fire had spread beyond control by the time fire fighters arrived. Detection by an automatic detection system at a hardware warehouse at Calgary, Alta., was delayed because the system had not been extended to a recently installed mezzanine where the fire started.

In the 77 instances where fire was discovered without appreciable delay, the tremendous advantage gained by prompt detection so that professional fire fighters could get into action while the fire was small was lost at 54 fires because alarm transmission was delayed. The chief offenders were occupants (33 instances) who chose to try to put out the fire without professional help and only called the fire department after the fire had gotten out of control. Other recurring reasons for delayed alarm were six instances of burned telephone wires, four cases of bystanders neglecting to transmit the alarm and two inoperative fire alarm boxes.

Extinguishers, Standpipes, Brigades

Most large loss fires had grown to "pumper stream" size before discovery and in these instances fire extinguishers and standpipe hoses were not a factor in the outcome. Fire extinguishers were used in 30 cases but for the following reasons were ineffective: fire too far advanced on discovery 22, wrong type for class of fire 5, improper use 2 and inoperative 1.

There were 32 fires where losses would probably have been considerably less had standpipe hoses been available. Employees made effective use of standpipe hoses at 10 fires. At 14 others standpipe hoses were ineffective: fire too far advanced at discovery 10 cases, water shut off two, hose deteriorated one, standpipe too far from fire one.

Fourteen private fire brigades performed their duties satisfactorily, but in four cases they could not do so because of insufficient equipment. At 46 fires the absence of a well-trained and equipped fire brigade was a notable weakness in private fire protection.

Fire Causes

Reliable information on causes was not available for many of the 225 building fires because evidence was destroyed. Of the 65 known or probable causes, careless cutting and welding practices accounted for seven, wiring faults seven, trash fires six, incendiary or suspicious fires five, sparks from incinerators three, defective motors three, and careless smoking, children with matches, and defective ceiling furnaces two each.

Sprinkler Protection

Forty of the 225 buildings involved in large loss fires in 1955 were provided with a sprinkler system. If the statement is valid that sprinklers will prevent most large loss fires, how can we account for the fact that 18 per cent of the building fires occurred in sprinklered buildings? The explanation is found in a study of the 40 "sprinklered" large loss fires, from which it will be seen that in most cases where sprinkler performance was unsatisfactory the trouble lay in the installation and maintenance of the particular systems in question. In the face of this concentration of unsatisfactory performance one should keep in mind the fact that this study dealt exclusively with large fires and that in a recent study of sprinkler performance,* sprinklers performed satisfactorily in 96.2 per cent of the 58,971 fires studied.

Thirty-two of the buildings were completely sprinklered. In one case the sprinkler system was not a factor (industrial plant) and in four others sprinklers performed satisfactorily (three industrial plants, one warehouse).

At eight fires involving completely sprinklered buildings sprinkler performance was not satisfactory because the hazards of occupancy were too severe for the systems as installed (all industrial plants). In six instances water was shut off (four in industrial plants, one in a warehouse, one in a vacant building). Five sprinkler systems were damaged by explosions (all industrial plants). In three instances there was insufficient water for sprinklers (all in industrial plants). Three exposure fires overpowered sprinklers (two in industrial plants, one warehouse). In one case (a warehouse) improperly stored stock prevented proper water distribution, and at another the fire originated in an unsprinklered ceiling space (industrial plant).

Sprinkler performance was not a factor at three of the eight fires involving partial sprinkler systems. These three fires originated outside of and did not spread into sprinklered areas (two store fires, one industrial plant). Two partial systems performed satisfactorily (both in industrial plants). Unsatisfactory performance of partial systems occurred three times because fires originating in unsprinklered areas reached such intensity before entering sprinklered areas that sprinklers were overpowered (one home for aged, one historical building, one night club).

*Automatic Sprinkler Tables—1955 (Q48-12); Published by the National Fire Protection Association. Price 25 cents.

Editor's Note: An asterisk (*) before a listing of a fire indicates that the fire spread to other buildings. A dagger (†) after a loss figure indicates that the figure includes an insured business interruption loss. The Index appearing in this issue of the QUARTERLY will aid the reader in locating examples of important contributing factors to the large loss fires.

78 Largest Industrial Fire Losses of 1955

The 78 large loss industrial fires in the United States and Canada during 1955 were three more than in 1954 but 11 less than the average for the past five years. In this group of manufacturing plant fire disasters occurring last year 22 persons were killed (including one fire fighter), 181 were injured (120 fire fighters), and dollar losses totaled $76,578,000. This loss was more than twice the $36,144,500 loss incurred by the 75 industrial large loss fires in 1954. The following paragraphs contain a summary of some of the more significant features of these fires and the factors responsible for the extensive damage.

Most Fires While Operating

More than half of the fires (40) occurred during daylight hours, forty occurred while the plants were operating, 33 were discovered by employees, and 41 fires were detected without appreciable delay. These four statistics when considered together indicate a pattern of experience quite different from that of stores, warehouses and most other occupancies where a majority of fires occur at night after employees have gone home, and are usually beyond control when discovered by outsiders.

Alarms Delayed in 24 Per Cent

Fire departments received notification of 56 fires by telephone, 12 by public fire alarm boxes and the remainder via plant sirens, police radio, etc. With prompt fire department notification vital if fires are to be extinguished before getting out of hand, it was significant that in 19 cases the fire alarm was delayed, the delay having a serious adverse effect on the outcome in each instance. Recurring reasons for delayed alarms were fires in which occupants spent several minutes fighting the fire before calling the fire department (9), burned telephone wires (4) and inoperative public fire alarm boxes (2).

Of the 76 manufacturing plant fires that occurred in buildings, two were in fire-resistive buildings, 18 in noncombustible buildings and 56 in buildings of predominantly combustible construction. The 1955 experience again showed the important part played by unprotected horizontal and vertical openings in large loss industrial fires. Absence of one or more means of limiting horizontal fire spread was noted in 56 fires. There were 39 instances of excessive floor areas subject to a single fire that should have been subdivided by division walls, nine cases of no fire doors in division wall openings, five of unprotected conveyor openings in division walls, six of sub-standard fire walls, and three of fire doors blocked open. In 24 of the 45 multistoried buildings (including 11 1-story buildings with basement) unprotected vertical openings contributed to fire spread, the most prevalent being 14 open elevator shafts and 13 stairways not enclosed.

Eighteen fires spread beyond the building of origin for one or more of the following reasons: combustible construction without adequate separation (11), poorly constructed party walls (4), interconnecting passageways (4), and yard storage between buildings (4).

Contents Influence Spread

In all but 14 fires building contents influenced fire spread. Flammable liquids intensified and helped spread fire in 22 instances, escaping gas in three. Flames spread rapidly because of dust on structural members in 11 buildings, and in three, dust explosions occurred. Surprisingly, rubbish accumulation and generally bad housekeeping was a notable factor in only three fires.

Too Many "Sprinklered" Losses

There was no sprinkler protection in 46 of the 76 buildings where these fires

occurred. Complete sprinkler protection was provided in 27 buildings and partial protection in three. The 27 fires in completely sprinklered buildings far exceeded recent experience (12 in 1954; 12 in 1953). Sprinklers were not a factor at the Memphis, Tenn., insecticide plant because no fire followed an explosion. Sprinklers performed satisfactorily in three of the 27 instances (vegetable oil refinery, Minneapolis; metalworker, Hatboro, Pa.; tannery, Taunton, Mass.) though large losses occurred by reason of explosion or other special factors. Performance was not satisfactory in the other 23 cases for reasons typical of the general experience with automatic sprinkler performance in all fires covered by NFPA statistics, which show about 3.8 per cent average unsatisfactory sprinkler performance, 96.2 per cent satisfactory. In eight fires the hazard of occupancy was too severe for the sprinkler system as installed: furniture factory, Hazelwood, N. C.; furniture factory, Lewisburg, Pa.; woodworking plant, Woodstock, Me.; seat cushion plant, Owosso, Mich.; cloth dye works, Sloatsburg, N. Y.; blanket factory, Collinsville, Mass.; wood building supplies factory, Newark, N. J.; cloth finishing plant, Canton, Ga. Five sprinkler systems were damaged by explosions: plastics manufacturing plant, Rosslyn Station, Pa.; bakery, Chicago; paint factory, San Francisco; chemical plant, Midland, Mich.; alcohol distillery, Philadelphia.

In four cases water was shut off,—prematurely shut off at a wood box plant, Baltimore, and at a cotton felt factory, Newark, N. J.; shut off to prevent freezing at a Philadelphia cotton mill; shut off during building repairs at an electrical appliance plant, Manville, R. I. There was insufficient water for sprinklers in three instances: cork board factory, Kearny, N. J.; finishing mill, Mechanicsville, Conn.; cloth finishing mill, Freetown, Mass. In two instances exposure fires overpowered sprinklers: meat packing plant, Prince Albert, Sask., shipyard, Lauzon, Que.; and at a paper coating plant at Pawtucket, R. I. fire originated in an unprotected ceiling space.

Partially Sprinklered Buildings

In addition to the 27 complete sprinkler systems, three partial systems appeared in the 1955 large loss industrial fire record. The partial system at Chanute Air Force Base, Ill. was not a factor, since fire did not enter the sprinklered paint room from the otherwise unsprinklered machine shop. At Grand Haven, Mich., a partial system held in check fire that originated in an unsprinklered addition and at a Memphis, Tenn., feed mill sprinklers on lower floors performed satisfactorily following a dust explosion.

Other Principal Factors

Watchman protection was provided at 29 of the plants suffering large loss fires. The presence of a watchman had no bearing on the outcome in 12 cases, in seven the watchman performed his duties satisfactorily but in 10 he did not.

The absence of a fire brigade contributed to the size of the loss at 27 fires. At 11 others, a well equipped and trained brigade played a major part in preventing still more extensive damage. Eight brigades were ineffective either because of insufficient fire fighting equipment or because the fire was too advanced at discovery for their capabilities.

Not included in the above summary of sprinkler performance was the unsatisfactory performance of an automatic soda-acid sprinkler system at a rubber eraser plant in Atlanta. This type of sprinkler system was designed for use in light hazard occupancies in locations without adequate water supplies and was certainly not designed to protect against hazards inherent in a rubber processing plant.

An asterisk (*) before a listing of a fire indicates fire spread to other buildings.

A dagger (†) after a loss figure indicates that the figure includes an insured business interruption loss.

Free Press Standard

Roof timbers directly above this dry kiln at Carrollton, Ohio, ignited after the kiln load shifted and broke the kiln dome. Fire was being confined to the kiln room until a 4-inch gas pipe broke. Hand wheels at the gas shut-off valves had been removed.

Brick Works

July 30, Carrollton, Ohio Carroll Clay Co. $250,000†

Refractory specialties for steel mills. During the night the high-piled load in the 70-ft.-diameter kiln (originally constructed for firing lightweight pottery) shifted, pushing the kiln roof up. When this occurred, heat was released (2300°F. temperature in the kiln) which ignited roof timbers directly overhead. The two employees present attacked the fire with hand extinguishers but the fire spread rapidly out of control beneath the wood roof of the kiln room.

Firemen confined the fire to the kiln room for 30 minutes. Then a 4-inch gas pipe broke which released large volumes of gas into the kiln room. Fire fighters were forced out and the fire then spread through an unprotected opening in a fire wall to the drying room.

Firemen tried to shut off the gas at the control house only to learn that the gas company had removed the hand wheels from the shut-off valves. Gas company employees were summoned at once, but it was an hour before the gas was shut off. During this time escaping gas interfered with effective fire fighting. Firemen did, however, manage to confine the fire to the kiln and dry rooms until part of a hollow tile fire wall collapsed and fire spread to the storage area.

Chemical Plants

April 3, Midland, Mich. Dow Chemical Co. $300,000; 1 killed

While acrylonitrile was being mixed with other chemicals in a closed mixing kettle in the second story the agitator stopped. The excessive pressure that thereby developed in the kettle blew off the cover of the kettle releasing acrylonitrile, which after vaporizing and forming an explosive vapor-air mixture, exploded violently. Electrical equipment which had been damaged when the cover was blown off was a possible ignition source.

One employee was fatally burned and two received nonfatal injuries. The explosion extensively damaged the building and equipment, including the sprinkler system, and was followed by fire that was controlled by the plant and public fire departments.

April 28, Kearny, N. J. Koppers Company, Inc. $527,500†

Naphthalene moth balls. At 12:15 P.M. an employee smelled smoke and on looking up discovered that the motor driving a bucket elevator that conveyed naphthalene chips to a hopper was on fire. Employees rushed to attack the fire with carbon dioxide and foam extinguishers, but because of the location of the fire overhead and its rapid spread through the dusty superstructure their efforts were fu-

Approximately 1,000 ft. of the exhaust duct from a rayon spinning machine at Front Royal, Va. was destroyed by fire on May 12. The duct shown in the photo was lined with a "slow burning" plastic applied to plywood. The outside was corrugated cement asbestos board.

tile. In the meantime the fire department had been called, but despite prompt response the fire had involved most of the unsprinklered 150 ft. by 50 ft. 1-story masonry, steel-framed building when apparatus arrived. A masonry wall that should have saved half the building was ineffective because a fire door in the wall had not been closed.

May 12, Front Royal, Va. American Viscose Corp. $1,500,000

Rayon spinning. Ignition of oily deposits on the ceiling and in drip pans in the first story by sparks from a cutting torch being used in the second story was the probable cause of this fire, that for the most part was confined to large capacity exhaust ducts that carried flammable, toxic and corrosive waste fumes away from the double deck spinning machines. The plastic-lined ducts within the building were metal, and on the roof they were plywood. The fire flashed rapidly through the unsprinklered duct, burning off the plastic and igniting the plywood.

For a detailed report see the July 1955 NFPA QUARTERLY, pp. 47-51.

May 26, Philadelphia, Pa. Publicker Industries, Inc. $786,500; 4 killed

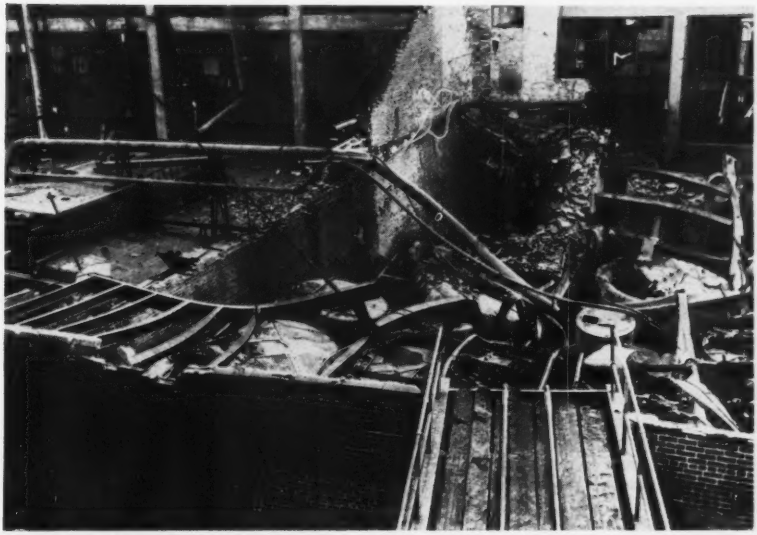
Ethyl alcohol denaturing. An explosion of flammable vapors that had been allowed to accumulate in this 4- and 5-story brick, steel-framed building killed four men, extensively damaged the building, wrecked the sprinkler system and started a fire that burned out of control for 2½ hours.

Unsafe practices in handling flammable liquids that were responsible for the loss included weighing and transferring in open tanks and troughs, lack of positive ventilation in the building, and termination of storage tank vent pipes in the building.

For a detailed report see the July 1955 NFPA QUARTERLY, pp. 65-67.

Sept. 14, Barberton, Ohio Columbia-Southern Chemical Corp. $580,000†

Following a plant shut-down due to a strike, employees were placing a pulverized coal-fired steam boiler in operation (385,000 pounds of



Philadelphia Fire Department

At a Philadelphia alcohol plant, four men were killed by a flammable vapor explosion on May 26. Failure to take steps to prevent accumulation of flammable vapors allowed an explosive atmosphere to exist in the building.

Utah Rating Bureau

Ignition of hexane released during the solvent extraction of resin caused this destruction at Bauer, Utah, Sept 20 (see report on next page).

steam per hour at 900 psi and 800°F.) when a coal dust explosion occurred that severely damaged the furnace.

Investigations indicated that improper operating procedure permitted the conditions to exist that caused the explosion. These conditions may be summarized briefly as follows: The day crew had worked on the furnace, but had gone off duty before the lighting took place. Assuming that everything was in readiness for lighting and without checking the various control valves and equipment, the night crew proceeded with the lighting routine. No one noticed that an air control valve which should have been closed was open. Because of this condition excessive air flow was required to develop the necessary air pressure in the cyclone burner. Immediate steps were not taken to find the cause and correct it, and about an hour later, when someone discovered the open valve and closed it, the air flow through the cyclone burner thereby increased sufficiently to prevent continuous ignition of the cloud of pulverized coal. Thus, unburned coal dust discharged from the burner into the hot furnace where it exploded on reaching concentrations within the explosive range.

Sept. 20, Bauer, Utah Combined Metals Reduction Co. $270,500

Resin extraction. Ignition of hexane vapors that escaped from extraction equipment was the cause of fire that destroyed this unsprinklered 4,724 sq. ft. noncombustible building (corrugated asbestos board on steel frame). In the last stage of extraction of resin from ore, resin-rich hexane was heated to 620°F. in an evaporator to drive off the last fraction of hexane (see photo, page 293).

Believing that all hexane had been driven off, employees started to draw off molten resin (at above the ignition temperature of hexane) through an open spout. Hexane vapors escaping from the spout ignited. A 15-pound carbon dioxide extinguisher was discharged at once but before the fire was extinguished a second more serious flash fire occurred. This latter flash apparently involved hexane vapors that had escaped from the hexane condenser some distance away and had flowed to and been ignited by the first fire. Employees managed to escape without serious injury as fire rapidly enveloped the building and equipment containing more than 9,000 gallons of hexane.

Of the several explanations that have been advanced for the simultaneous escape of hexane vapors from the evaporator and from the condenser, the most plausible is that it was due to use of compressed air to clean filters that were installed in the hexane-resin transfer system just ahead of the evaporators. This practice was contrary to plant procedures.

Nov. 2, Memphis, Tenn. Arvey Corp. $425,000†; 2 killed

Chlorinated hydrocarbon insecticide. Explosion of a 500-gallon glass-lined steel reactor killed two of the five employees in the 1,080 sq. ft. 3-story steel-framed, asbestosclad building and wrecked most of the building. Early rescue attempts were hampered by vapors of chlorinated hydrocarbons and nine of the rescue party were hospitalized.

The building's sprinkler system was wrecked, but since no fire ensued this was not a factor in the degree of damage. Hoses equipped with spray nozzles were used to wet down the wreckage and wash away chemicals.

Cause of the explosion has not been determined. Reportedly the normal reaction temperature of 320°F. was exceeded, and the explosion occurred while unsuccessful attempts were being made to stop the temperature rise by circulating cold water through the reactor jacket. The batch that exploded was only the second to be processed following a major change in the process.

Electric Generating Plant

July 28, Cheshire, Ohio Ohio Valley Electric Corp. $250,000

Steam-powered electric generating plant. Coal for this new plant was transported from the yard to boiler room bunkers 93 feet above grade by conveyor belts that carried the coal 216 feet through an underground tunnel and then on an 800-ft.-long incline to the top of the bunkers. Originally only one rubber-covered fabric belt 42 inches wide had been installed but just prior to the fire a second belt had been added as a standby.

The fire broke out in the tunnel just after a test had been run on the new belt. Apparently misalignment of a roll had caused the roll to overheat and ignite the belt when the test was concluded.

Members of the plant fire brigade equipped with breathing equipment entered the un-

sprinklered tunnel and were gaining control of the fire when the new belt burned through and permitted take-up weights on the elevated section of the conveyor to drop and snap the burning belt out of the tunnel. As burning belting came to rest on and beneath the above-ground section of the conveyor the second belt ignited and heat caused steel supports to warp.

Plant and public firemen were able to control the fire in the tunnel and on the lower part of the inclined section with hose streams, but hose streams directed from the ground were not effective on the fire at the tipple end of the incline. Fire threatened to enter the coal bunkers but was checked before doing so by plant firemen using five large hoses connected to standpipes in the plant.

Fertilizer Plant

***Sept. 19, Kenbridge, Va. Farmers Cooperative Fertilizer Purchasers, Inc. $250,000**

Dry mix fertilizer plant; feed and building materials storage. Delayed discovery due to absence of watchman or automatic fire protection gave fire opportunity to spread beyond control in the undivided 40,000 sq. ft. 1- and 4-story combustible fertilizer plant before discovery by a passerby at 11:00 P.M. Also destroyed was an 18,000 sq. ft. 1-story wooden warehouse four feet from the fertilizer plant. Strong winds played an important part in the rapid spread of fire.

The cause remains undetermined although fire officials lean toward heating of quicklime by rain water deposited by Hurricane Ione.

Food and Food Products

Animal Feeds

Jan. 27, Memphis, Tenn. Allied Mills, Inc. $625,000

Feed mill with grain elevator. A dust explosion blew out a large section of the reinforced concrete walls of the 85-ft.-high elevator, blew small holes in the workhouse floor (bin top), removed inspection covers and lifted the concrete roof of a raised section of the elevator several feet. The explosion is believed to have originated in a quarter bin into which cracked corn was being dumped after passing through a cracker on the first floor.

No employees were above the first floor when the explosion occurred. Of the 30 men on the first floor nine were injured. The

United Press

Foreign material in a grinding mill was the probable cause of this dust explosion at the Memphis, Tenn., feed mill.

clothing of one was ignited by flames that flashed down the shaft bin to the track platform. Twenty-two sprinklers on the first and work floors held the ensuing fire in these areas in check. Hose streams were used for 24 hours to put out the several small fires in the grain bins.

No means were provided for removing foreign material from grain before it entered grinding mills, lending credence to the belief that grain ignited by a friction spark may have been carried into the quarter bin where it ignited a dust cloud.

March 6, Des Moines, Iowa Sargent and Co. $440,000

Livestock feed. An overheated hammer mill that had been stopped twice during the day because of overheating was the probable cause of fire that was visible at the top of the 2-story masonry, wood-joisted building when firemen answered an outsider's alarm at 8:23 P.M. Thirty minutes earlier a passerby had noticed that a dust collector on the roof was red hot and notified an employee inside but was told to mind his own business.

Firemen at first believed they were going to be able to hold fire damage to the elevator section, but a mild explosion forced them outside, and spread the fire throughout the unsprinklered 10,000 sq. ft. 2-story section. Hose streams were used successfully to prevent flames from entering an adjoining 1-story section through unprotected doorways.

Wide World

This fire in a Chicago bakery was preceded by an explosion that killed two and broke sprinkler piping.

Bakery

***Sept. 1, Chicago, Ill. Carr-Consolidated Biscuit Co. $1,500,000; 3 killed**

Cookies, crackers. An explosion of undetermined cause and ensuing fire took the lives of two of the 101 employees in the three communicating bakery buildings. Twenty-nine others were injured, principally by burns as they fled from the building. The third fatality was a Salvation Army Mobile canteen driver involved in an accident on the way to the fire.

The explosion reportedly occurred in a 3-story annex where employees were packaging cookies. Since sprinkler piping was broken by the blast, fire spread quickly through the annex, and by way of an enclosed passageway to the second story of the 6-story main building. Here open stair and elevator shafts and lack of water for sprinklers due to broken pipe allowed the fire to spread to all stories.

Cannery

June 15, Vincentown, N. J., F. C. Stokes Co. $500,000

Tomato and sweet potato canning. The nine unsprinklered and interconnected wooden buildings that comprised this cannery were destroyed by fire while employees were readying the equipment for the forthcoming tomato canning season. The fire started in the machine shop where an employee was grinding a bolt on a work bench. Beneath the bench was a freshly filled 5-gallon can of gasoline on the outside of which some gasoline had spilled. Sparks from the grinding operation ignited the gasoline according to the Fire Chief.

The employee tried to carry the burning can outside but was forced to drop it, after

United Press

Two hours after this coffee roasting plant at Birmingham, Ala., had been locked up for the weekend this fire was discovered by a passerby. The building was without automatic and watchman protection.

which fire spread rapidly and was beyond control in the undivided and combustible buildings when firemen arrived.

Coffee Roasting

***Oct. 15, Birmingham, Ala. Donovan Coffee Co., et al. $335,000**

Coffee roasting; department store warehouse. At 2:00 P.M., two hours after the unsprinklered 4-story brick, plank-on-timber coffee roasting plant had been locked up for the weekend, a passerby noticed smoke coming from a partially opened window in the third story where green coffee beans were stored. When firemen arrived a mild explosion occurred that broke all third story windows and immediately flames enveloped the third story. Large quantities of smoke from the burning coffee made fire fighting extremely difficult. Flames spread up open elevator shafts to the fourth story and destroyed the fourth story and roof.

Floor timbers in the party wall between the coffee roasting plant and an adjoining warehouse were not self-releasing and were not staggered with those of the warehouse. When timbers in the coffee plant fell, they opened cracks in the party wall through which heat passed into the third and fourth stories of the warehouse. Five sprinklers operated to prevent fire from developing in the warehouse.

Fruit Packing

June 28, Underwood, Wash. Underwood Fruit & Warehouse Co. $397,000

Fruit packing, storage. This two-story plant, 1300 ft. long by 35 ft. wide was divided into four sections by 8-inch hollow tile walls. Two sections were destroyed and a third heavily damaged by fire that broke out during the inactive season when the only contents were empty fruit boxes.

The fire originated in the high 1-story wooden fire division at one end of the long building and had burned an estimated two hours before discovery by a passing truck driver at midnight. When apparatus from Bingen arrived (Underwood had no fire department) the fire had already entered the next fire division (hollow tile, wood-joisted) by going over a 12-in.-high parapet on an 8-in.-thick hollow tile division wall and by spreading along an almost continuous 10-ft.-wide wooden awning along one side wall. A 1-ft.-wide clear space in the awning at the division wall was not an effective barrier to fire spread. Intense heat later caused the 8-in. hollow tile division wall to collapse.

The Bingen Fire Department with the assistance of departments from other towns tried to confine the fire to the second fire division and appeared to be succeeding when once again the fire jumped a parapeted 8-in. hollow tile division wall and entered the third fire division.

By this time departments from seven towns were on the scene and had 10 engines taking suction from the nearby Columbia and White Salmon Rivers. By concentrating their attack on the fire in the third fire division, fire fighters were able to prevent spread to the fourth and last division.

Nov. 17, Summerland, B. C. Occidental Fruit Co., Ltd. $507,000

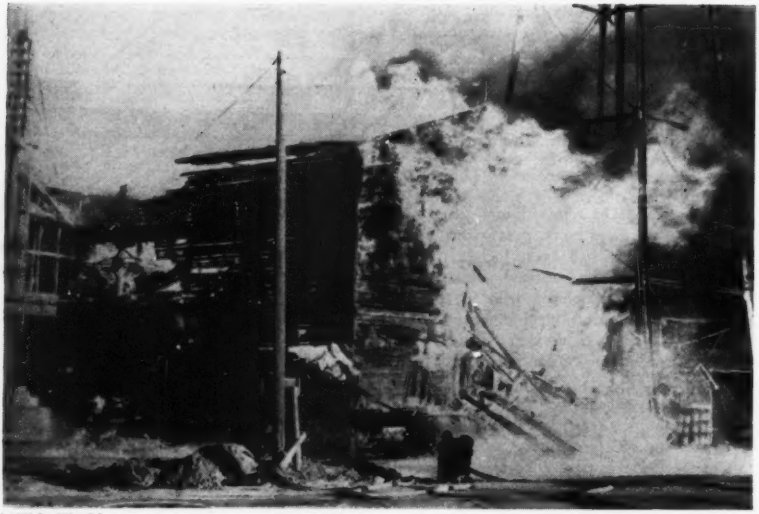
Apple packing. A defective oil stove was the apparent cause of fire that destroyed this unsprinklered 47,200 sq. ft. 2-story wooden building. The fire originated in the watchman's office on the first floor while the plant watchman was on a tour. He discovered it on his return but by then telephone wires had burned preventing his telephoning the alarm. A further delay resulted when he found the nearest fire alarm box frozen and inoperative. The alarm was finally transmitted after the watchman ran to the fire chief's home but by then the fire had spread to a large stock of apple boxes in the undivided wooden building and was beyond control.

Meat Packing

***Sept. 16, Prince Albert, Sask. Burns & Co., Ltd. $1,767,000**

Meat packing, slaughtering, egg sorting and storage; office. At 6:30 A.M., one hour after the night watchman went off duty, an employee reporting for work saw a fire in trash in a 3-ft. alley between a 1200 sq. ft. 1-story wooden egg sorting building and a 21,600 sq. ft. 3-story reinforced concrete building under construction. The construction work had necessitated shut off of sprinklers in the egg sorting building.

The alarm was given at once, but three minutes later when the inadequately manned fire department arrived (there was no plant fire brigade) the fire was spreading up a wall of the egg sorting building. Fire soon enveloped this building and its contents of egg cartons and spread before a



Wide World

This Prince Albert, Sask., meat packing plant fire started in trash beside the wooden building in the foreground, spread to and consumed the sprinklered wooden office building at right and swept into the reinforced concrete building under construction in background. Steel supports for 40,000-gallon water tank (right foreground) collapsed.

brisk wind to a sprinklered 4,032 sq. ft. 2-story wooden office building 50 ft. from the egg sorting building. The office building was also about 3 ft. from the building under construction. Flames spread over the sides and roof of the office building and while sprinklers inside held fire that entered windows for a while, the walls and roof eventually collapsed.

Oiled plywood wooden forms had been removed from the first story of the building under construction but were still in place in upper stories. Loose forms and combustible material were piled on all floors. Flames from the exposing egg plant and office building entered the building under construction and spread via unprotected openings to an adjoining sprinklered 7,200 sq. ft. 4-story brick, wood-joisted slaughtering and cooling building. Sprinklers held the fires in check at the unprotected openings. However, fire entered a 4-ft.-high roof space filled with wood shavings where it burned out of range of sprinklers. Eventually, with the entire roof burning and sprinklers operating at unprotected doorways and windows on the side adjoining the building under construction, sprinklers were overpowered and the slaughtering and cooling building was destroyed.

Also destroyed by the fire was a 40,000 gallon water tank elevated 100 ft. on unprotected steel supports. Heat from the fire collapsed the supports. Ordinarily this tank served as a secondary supply for sprinklers but had been temporarily disconnected due to the building construction. Apparently absence of a secondary supply was not a factor.

Leather Working

March 2, Taunton, Mass. Geilich Tanning Co. $300,000; 1 killed

Inner linings, uppers, belt and bag leathers. When the spray liquid used in a spraying machine was changed from a waterbase emulsion of relatively low hazard to a liquid employing a 53°F. flash point solvent, no changes were made in ventilating facilities to remove flammable solvent vapors. This oversight resulted in a flash fire that caused the death of one employee and burns to four others.

The fire started when an employee attempted to replace a burned-out light bulb in an explosion-proof fixture without turning off the current. The bulb broke before it was removed causing the filaments to come together.

Solvent vapors that had accumulated near the floor in the vicinity of the spraying machine were ignited by a piece of hot filament. The flash fire was quickly extinguished by sprinklers except in the unsprinklered dryer through which the leather passed after being sprayed. Here an intense fire involving lacquer residue burned out of control until extinguished by fire department hose streams. Toxic oxides of nitrogen developed by the fire suffocated an employee.

While sprinklers were being shut off, the stem inside the gate valve broke, resulting in water flow from sprinklers until street valves were closed 1½ hours later.

***Oct. 29, Sugar Hill, Ga. Georgia Shoe Manufacturing Co. $455,000**

Leather boots and shoes. Destruction of this 14,400 sq. ft. building is additional evidence that disastrous fires can occur in buildings of noncombustible construction when the contents are combustible and there is no automatic fire protection. In this instance the possibility of a disastrous fire was increased by the absence of a local fire department and reliance as inadequately trained and manned neighboring fire department.

The building involved was one of three of a congested group that comprised the factory. Walls were 8-in. hollow tile, roof beams and columns were unprotected steel and the roof deck was a lightweight concrete aggregate. An identical building was seven feet away and a 4,000 sq. ft. masonry, wood-joisted warehouse adjoined the fire building.

The fire was discovered by the watchman at 3:20 A.M. during a thunderstorm and may have been caused by lightning. When discovered it was confined to rolled leather wrapped in heavy paper and stored along a wall. The fire department in the next town was telephoned after which the watchman tried unsuccessfully to extinguish the fire with hand extinguishers (a standpipe with hose was not available). A fire truck finally arrived with one man and because of the time taken for additional men to assemble and their poor training it was 5:30 A.M. before water was being put on the fire.

About this time the concrete roof collapsed on the fire, causing a notable reduction in the intensity. Heat ignited the wood roof of the adjoining warehouse but fire departments from other communities arrived in time to save this structure.

Metalworking

Electrical Appliances, Equipment

Sept. 7, Grand Haven, Mich. Camfield Mfg. Co. $802,500†

Electrical appliances. At 5:20 P.M. employees attacked a fire that broke out at an overheated automatic polishing machine, and after supposedly putting out the blaze, took time out for lunch. Ten minutes later the fire was again noticed at the polishing machine and again employees tried to put it out with extinguishers without giving the alarm, but this time the fire spread out of control.

Before firemen arrived flames were spreading through the undivided new part of the 30,500 sq. ft. 1-story building which had only been in operation three months and was not yet sprinklered. Fire spread through unprotected doorways to the communicating sprinklered older section where it was brought under control by fire department hose streams and sprinklers.

***Sept. 12, Manville, R. I. Royal Electric Co., Inc., et al. $7,000,000**

Christmas tree lights, fuses; yarn storage. Five interconnected brick, plank-on-timber buildings with a total ground floor area of approximately 215,000 sq. ft. were destroyed by fire that broke out in flood debris in the middle of the third story of a 900 ft. by 100 ft. 5-story building.

On August 19 a flash flood on the river that passed through the plant site had washed away a large part of one wall of this building and so damaged flooring that sprinkler protection in the 535 ft. by 100 ft. section where the fire started had not been restored. Sprinklers in most of the rest of the building of origin and in communicating buildings had been put back in service. There was no secondary supply since the steam fire pump had not been restored to service due to flood damage to boilers and since suction equipment on an electric fire pump had also been damaged by the flood.

When discovered in the debris the fire was small, but although fire department response was prompt, fire had spread to all parts of the flood-damaged section before apparatus arrived. Flames then swept through unprotected openings to sprinklered sections of the building and through passageways to communicating buildings. The available water supply for

Woonsocket Call

The most disastrous of several fires following floods in 1955 occurred at this electrical appliance factory at Manville, R. I. Sprinklers in the section where the fire started were out of service until flood repairs could be completed.

sprinklers in exposed sections and buildings was quickly overtaxed.

For a detailed report see the October 1955 QUARTERLY, pp. 156-157.

Foundry

Aug. 10, East Los Angeles, Calif. A. O. Smith Corp. $1,850,000

Liquid metering devices. Only one watchman was provided for the 20 buildings at this 20-acre plant, and fire burned for at least 37 minutes in a 9,600 sq. ft. 1-story metalclad building before discovery by the watchman at 5:58 A.M. Oil-soaked storage shelves, wooden pallets and heavily lacquered patterns helped spread the fire through the undivided and unsprinklered building. A pile of crating lumber and a pile of pallets 25 ft. from the fire were also destroyed. Two more watchmen have since been hired.

Machine Shops

***May 5, Columbia City, Ind. Whitley Products, Inc. $920,000†; 4 killed**

Screw machine products. While a small wastebasket of trash was being burned in the yard a high wind developed that carried the fire to a pile of oil-saturated metal turnings nearby. The fire was attacked by several employees using hand extinguishers for almost an hour before the fire department was finally summoned. During this time the fire spread to an adjacent wooden warehouse and from there jumped to the eaves of a 350-ft.-long unsprinklered 1-story masonry, wood-joisted machine shop where about 70 employees were at work.

When fire entered the undivided attic, smoke filled the building so rapidly that many employees had to be rescued. Three of the four who died were trapped while engaged in rescue work.

Sept. 6, Chanute Air Force Base, Ill. United States Government $554,500

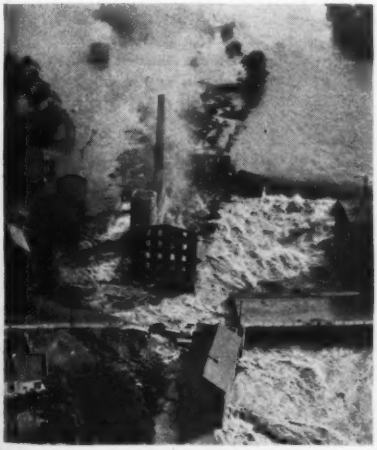
Maintenance shops for the air base. The lack of consideration for fire safety in the design and protection of this building was reflected in its destruction. The 1-story wooden building comprised a single combustible fire area of 38,880 sq. ft. No watchman or automatic detection system was provided and the sprinkler protection was confined to a 1,960 sq. ft. concrete block paint and dope room in a corner of the building. The fire broke out

during the night when no one was in the building and was beyond control when discovered by a passerby at 11:35 P.M. The only part of the building not involved in the fire was the cut-off paint and dope room. Heat was not great enough to operate sprinklers.

Oct. 23, Inglewood, Calif. Sanford Aircraft, Inc., et al. $566,000

Machining aluminum and magnesium parts. Five concerns occupying this 35,000 sq. ft. 1-story combustible building lost their operating space when fire that broke out on a Sunday afternoon destroyed the building. Ignition of a wooden partition by an overheated electric motor on a soft drink cooler in the employees' coffee room was a possible cause.

Lack of automatic protection and watchman service allowed the fire to break through the roof before being discovered by a passerby at 4:51 P.M. Lack of fire division walls, the presence of wooden and combustible fibreboard partitions, and magnesium and aluminum stock piled high on combustible shelving were among the factors noted by the fire chief as being responsible for the extent of fire when the first engine company arrived. At that time the fire was so intense that exposure protection was of prime importance.



Wide World

Flood waters prevented access to this Putnam, Connecticut, magnesium fines plant for fire fighting.

Magnesium Fines

Aug. 19, Putnam, Conn. Metal Sellers Corp. $500,000

Magnesium fines. During a flash flood water flowed into the basement and first story of this 5-story brick, wood-joisted building in which magnesium was ground into fines. It is thought probable that the fire broke out when water reached the boilers. No fire fighting was possible due to the surrounding of the plant by a sea of water, and when the fire spread to upper stories it was intensified by magnesium fines in drums and bins. Punctuated by explosions, the fire rapidly involved the building and raged unchecked until there was nothing left to burn.

During the fire, drums of burning magnesium fines floated from the building. Many exploded as they were carried downstream and in a few instances flaming debris tossed into the air by the explosions ignited buildings along the river.

See "Fire and Flood" published in the October 1955 NFPA QUARTERLY.

Metal Plating

***Sept. 11, Los Angeles, Calif. Plating Engineering Co., et al. $250,000**

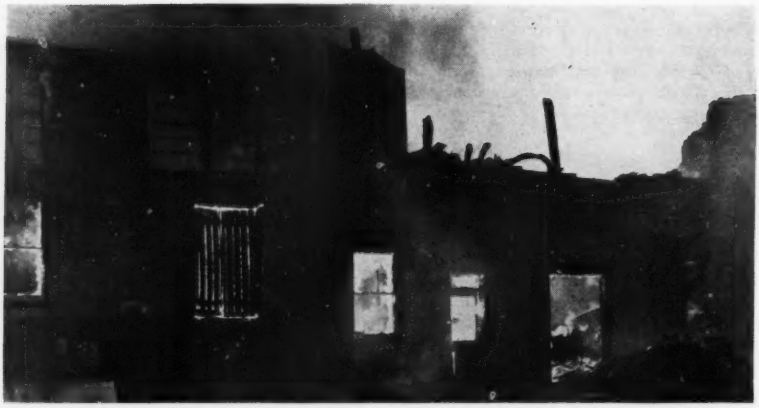
Electroplating shop; ditch digging equipment mfg. At 11:00 P.M., Sunday, four hours after an employee had gone to the plant to light gas burners under plating tanks and had then returned home, a passerby discovered fire that had by then involved the interior of the 10,660 sq. ft. electroplating building and had ignited an adjacent 41,000 sq. ft. 1-story wooden exposure. Both buildings were destroyed but fire fighters successfully protected other exposures.

Neither building had automatic fire protection or watchman service.

Metal Reclaiming

Dec. 22, Montreal, Que. Metals and Alloys, Ltd. $500,000

Ingots of copper alloy, babbitt and solder from scrap brass, bronze and lead. During the night when the unsprinklered 7,500 sq. ft. 1-story wooden building was unoccupied, fire broke out and made great headway before discovery by a passerby at 1:03 A.M. Details that might point to a probable cause were not available.



This fire in an East Donegal, Pa., steel fabricating plant was one of five large industrial losses in 1955 caused by careless welding. The damage caused by these five industrial plant welding fires totaled over $3,000,000.

Steel Fabrication

Jan. 11, East Donegal Twp., Pa., York Barbell Foundry and Marietta Machine Co. $500,000

Iron and steel athletic equipment. Operation of a welding torch in the vicinity of a paint dip tank spelled destruction for this undivided and unsprinklered 35,000 sq. ft. 1- and 2-story brick, wood-joisted building. The sparks landed in the dip tank at 9:30 A.M. while gymnasium benches were being passed through the tank. An employee threw a bucket of sand at the flames and then fled with the other 75 employees as fire raced through the building.

Feb. 16, Hatboro, Pa. American Metal Specialties Corp. $250,000†

Metal toy stamping, fabricating and storage. Old office records stored on a wooden platform above a degreasing tank and piled against the metal exhaust stack from the tank were ignited by heat from the stack. The degreaser had been used until 4:30 P.M., 1½ hours before the watchman in another building saw smoke coming from the roof monitor and telephoned the alarm. Sprinklers in the 21,600 sq. ft., high 1-story building held the fire in check until extinguishment was completed by fire department hose streams. This fire emphasized the susceptibility to water damage of uncoated thin steel stock, since damage to steel stock represented most of the property damage.

March 14, Gnadenhutten, Ohio Tusco Mfg. Co. $330,000

Metal specialties fabricating and painting. At 4:30 P.M. employees noticed a fire at the combustible fibreboard ceiling in the vicinity of a ¼-hp ventilating system motor. Instead of calling the fire department at once, employees elected to try to put out the fire themselves and discharged about 25 carbon dioxide and soda-acid extinguishers before telephoning for help. Flames spread along the ceiling and also ignited and spread along the wood roof deck of the unsprinklered 19,400 sq. ft. 1-story masonry, steel-trussed building.

High-piled crated stock, paint and thinner stored in not-cut-off areas also contributed fuel to the rapid-spreading fire. The one fire wall in the building was useless as a fire barrier since doorways were unprotected.

April 3, Fullerton, Calif. Transa Homes Corp. $250,000

Metal house trailers. This 32,000 sq. ft. 1-story wood-frame, metalclad building was destroyed and 27 new trailers parked outside were damaged by fire that was beyond control when discovered by a passing motorist at 1:16 A.M. The following private fire protection deficiencies were responsible for the loss: no automatic fire protection, substandard watchman service (a local watchman visited the plant twice each night), and no fire walls to divide the plant into fire areas.

May 11, Enola, Pa. Pennsylvania Railroad $300,000

Car repair shop, cafeteria, locker room, machine shop, blacksmith shop. Two-thirds of the 300-ft.-long, 1-story steel-framed, metal-clad building was destroyed by fire discovered about three hours after the shop had closed for the night. A wiring fault at a switchboard was the reported cause. With no sprinkler protection and weak water supplies from yard hydrants, the fire spread unchecked until it reached a fire wall separating the machine and blacksmith shops from the rest of the building.

Nov. 9, Milwaukee, Wis. A. O. Smith Corp. $300,000†

Automobile frames. A 60-ft.-high flammable atmosphere furnace used for annealing steel blanks was badly damaged by a gas explosion in the furnace. The explosion occurred when air entered through the furnace charging door and formed an explosive mixture with the combustible gas atmosphere in the furnace. The furnace had been equipped with a flame curtain at the charging door to prevent air from entering the furnace during charging operations. The flame curtain had been removed to facilitate installation of a vestibule at the charging door and had not been replaced after completion of the work.

Mining

Dec. 20, Splashdam, Va. Clinchfield Coal Co. $450,000

Coal tipple. With no private fire protection and the nearest public protection two miles away consisting of a portable pump, it is not surprising that fire destroyed this tipple. When firemen from Grundy, 35 miles away, arrived the structure was beyond saving.

Recent renovation entailing an expenditure of $250,000 did not include installation of private fire protection.

Paint and Varnish

Sept. 14, near Toledo, Ohio McKay Davis Chemical Co. $309,000

Artists' paint sets. At 2:46 A.M. neighbors were awakened by flames coming through the roof of this 22,000 sq. ft. 1-story brick, steel-beamed building, without protection of sprinklers, automatic fire detection equipment, or a watchman.

When firemen arrived three-quarters of the plant was involved and fire had spread from the not-cut-off paint storage area in the main building to the adjoining machine shop because a fire door was blocked open by stored material stacked against it.

Toledo Blade

The paint storage area where the fire originated in this plant near Toledo, Ohio, was not cut off. Other fire protection weaknesses were a blocked-open fire door and lack of sprinklers.

A nonexplosion-proof light fixture was the probable source of ignition of flammable vapors that had accumulated in the San Francisco paint factory shown at the left. Since sprinkler piping was broken by the explosion, fire spread rapidly through the two upper stories and extended to the machinery warehouse shown at the right.

***Sept. 23, San Francisco, Calif. General Paint Corp., et al. $855,000†**

Paint and varnish; storage and sale of second-hand machinery. The two employees comprising the night shift were piping hot varnish from a detached processing building to varnish storage tanks on the third floor of the sprinklered 6,300 sq. ft. 3-story wood-framed, stucco-clad building when a mild explosion occurred. Flames flashed through the third story and to the second story, burning one of the men as he fled downstairs. The explosion was sufficiently intense to rupture the bulk main at the top of the riser, thereby nullifying sprinkler protection. Fire spread to an unsprinklered 1-story wood framed, metalclad machinery warehouse two feet from the paint factory but was brought under control with fire department hose streams before causing extensive damage to the exposure.

There is not much doubt that the top two stories contained a flammable mixture of flammable liquid vapor when the flash or mild explosion occurred. These vapors may have come from a naphtha tank or from the hot varnish tanks, all of which had fill openings about 18 inches square in their tops. Just prior to the explosion the employees heard an arcing or snapping sound at a lighted ordinary light bulb suspended 15 inches above the opening in the naphtha tank.

Paper Working

Jan. 19, Cly, Pa. S. and S. Roofing Co. $250,000; 1 killed

Asphalt roofing paper. While a paper impregnating machine was being repaired, sparks from an oxy-acetylene torch ignited asphalt in the machine. Details of the fire are not available but reports do contain sufficient information on fire protection to explain the destruction of the 1-story brick, wood-joisted building. In the first place there was no major private fire protection such as sprinklers or a plant fire brigade, and in the second place there was no public fire department in Cly, the nearest department being at York, 15 miles away.

The fatality occurred when a 60-year-old employee re-entered the building to get personal belongings and was asphyxiated.

***Feb. 4, near Joliet, Ill. Prairie State Asphalt Products Co. $379,500**

Asphalt roofing materials. Two unsprinklered 1-story masonry, wood-joisted buildings with total ground floor area of 60,000 sq. ft. were almost totally destroyed by fire that was coming from the roof of the building of origin when discovered by a passerby at 6:57 P.M. Three hours earlier employees had gone home, thereby leaving the buildings to the mercy of any fire that might break out during the night. Stone walls subdivided each of the two buildings into work areas, but openings in these walls were unprotected. Openings in the brick wall between the two buildings were protected, but the wall was not parapeted and a wooden eave extended six inches beyond the wall.

Although the fire was in an area without any public fire protection the Joliet, East Joliet and Lockport Township Fire Departments dispatched two pumpers each. The building of origin was completely involved before this apparatus had all arrived and the fire was spreading beyond the substandard fire wall to the roof and interior of the adjoining building.

First arriving pumpers connected to yard hydrants supplied by an elevated storage tank but were soon forced to shut down when the tank became empty. (A well pump normally kept the tank filled but interruption of electric power had put the pump out of service.) Water pumped to the fire from Joliet mains by pumpers in relay was used to protect exposed buildings. Later, when a building employee opened the valve that permitted water to flow from city mains into the private yard system pumpers were able to get water from yard hydrants. No one has explained why this valve was closed at the time of the fire.

Feb. 7, Fort Francis, Ont., Ontario-Minnesota Pulp and Paper Co., Ltd. $262,000; 1 killed

Pulpwood grinding. Fire originating in the second story of the 280 ft. by 80 ft. 2-story steel-framed, metalclad building destroyed most of the second story and roof. The building was windowless and had only two doorways, both on the first floor where wood grinding equipment was installed. The second story, used for storage of pulpwood, contained about 350 cords at the time of the fire. Management had recently approved an expenditure for sprinkler protection but the installation had not as yet been made.

At 1:50 P.M. fire started at floor level (planks on concrete) in wood refuse that had accumulated beneath the pile of pulpwood. Sparks from a cutting torch being used to repair a conveyor in the building monitor were the probable ignition source. Visible flames coming up through the pile were quickly extinguished by the repair crew using a standpipe hose, but the water did not penetrate to the base of the pile and smoke soon became so dense that the men had to descend to the first story.

Members of the plant fire brigade wearing canister-type masks entered the windowless and smoke-filled second story but soon had to get out. One of three men overcome by smoke did not recover.

With no windows or doorways at the second story level, private and public fire fighters had great difficulty in getting water on the fire until holes were made in the metal walls. It was 5:00 P.M. before firemen were able to make their way up an inside stairway to the fire area. Three hours later the fire was considered under control.

July 6, Pawtucket, R. I. American Coated Paper Co. $300,000

Coated and glazed paper. The sprinklered 1-story wooden building of about 52,000 sq. ft. area that housed this paper coating plant was destroyed by fire that originated in the shallow unsprinklered space between the roof and combustible fibreboard ceiling of the 7,800 sq. ft. drying room. In addition to the wood roof deck, wooden joists and combustible fibreboard ceiling, this concealed space also contained paper-wrapped batts of noncombustible insulation.

Short circuit of old open wiring in the concealed roof space by a lightning stroke was believed to have caused a smoldering fire that was discovered when lights went out in the plant and in a detached garage at 10:10 P.M. Relatives of the plant owner who were repairing their car in the garage investigated, and on finding a glowing spot in the ceiling of the drying room attacked the fire with 15-pound carbon dioxide extinguishers instead of giving the alarm at once.

Definite information on the operation of sprinklers during the early stages of the fire was not available. It can be presumed that the fire reached serious proportions in the unsprinklered ceiling space before breaking through the combustible ceiling in several

Pawtucket Times

Originating in the unsprinklered concealed space between the roof and combustible fibreboard ceiling, fire at this Pawtucket, R. I., paper coating plant reached serious proportions before breaking through the combustible ceiling in several widely separated locations. So many sprinklers were opened almost simultaneously that the water supply was overtaxed.

Reginald McGovern

Inadequate water handicapped fire fighters at the plasterboard plant fire near Redwood City, Calif. Loss of electric power interrupted the plant's private water supply and several pumper approaches to San Francisco Bay were cut off by the heat from the fire. The company rebuilt in another city.

widely separated places almost simultaneously and opening so many sprinklers that the single source of supply (a 6-in. connection to an 8-in. city main) that the sprinkler system (1905 standard) was overtaxed.

Firemen responding at 10:32 P.M. found the building so heavily charged with smoke that they could not enter. On connecting to a yard hydrant they got very little water, indicating that most of the water was going to sprinklers. Believing that a post indicator valve controlling water to the yard hydrant must be partially closed, the plant owner tried to open it. In so doing, he snapped the valve stem, allowing the gate to drop into the supply connection and shut off water to sprinklers in the part of the plant where the fire started. (Investigation after the fire showed that the valve was open when the fire started.) Whether or not this premature shut-off of sprinklers materially affected the outcome is questionable, since as indicated above the fire had probably already opened more sprinklers than the system was designed to supply simultaneously.

Plasterboard

June 23, near Redwood City, Calif. Kaiser Gypsum Co. $925,000

Gypsum milling; plasterboard. The 60,000 sq. ft. main mill, 85 per cent wood framing with composition roofing on wood sheathing and 15 per cent all-metal construction, was destroyed by fire that broke out in the wooden section while the plant was in operation. The fire was first noticed in the roof structure three feet above the top of a plasterboard drying oven that operated at between 300°F. and 350°F. Possibly an undetected break in the oven insulation had allowed an excessive amount of heat to escape.

Employees immediately closed valves on all LP gas and fuel oil lines to the building, and asked the Redwood City Fire Department to send apparatus. This was done, although the plant was located outside the city limits, but the fire spread so rapidly beneath the roof of the unsprinklered and undivided building that the flames could not be checked in the main mill.

Fire fighters were handicapped by inadequate water. Early in the fire the plant's weak water supply was lost when the electricity went off. The nearest Redwood City hydrant was 2,000 ft. away, and some of the pumper approaches to San Francisco Bay were cut off by heat from the burning building. Making good use of the water available and helped by a favorable wind, firemen managed to save three other buildings of the plant.

Plastics Fabricating**

***Nov. 25, Russellville, Ala. Concord Supplies and Equipment Corp. $300,000**

Plasticized cloth mail bags. Many of the details of this fire are not known, but statements of employees indicated that shockingly hazardous conditions were tolerated at this plant.

The fire occurred in an unsprinklered 1-story addition to a large sprinklered wooden warehouse ordinarily used for the storage of surplus materials and rejects. On the day of the fire, however, the addition was used for manufacturing, since the process by which seams of plasticized bags were sealed had been moved from the factory to the warehouse because the vapors from the operation were so strong that employees became ill. Apparently it was felt that working conditions would be better in the addition.

Seam sealing consisted of painting the seams with a cement mixture containing a high percentage of highly flammable methyl ethyl ketone. An ordinary paint can and brush were used. No mechanical ventilation was provided and electrical equipment was not explosion proof. Smoking was not prohibited.

Conditions turned out to be no better in the addition, and when several of the employees complained of illness an office fan was set up in an attempt to clear the air. Fortunately, the fire did not occur until shortly after all employees had gone home, since fire flashed through the vapor-filled addition with great speed and would probably have severely burned anyone inside.

The adjoining sprinklered warehouse was separated from the addition by a wooden wall. The exposure fire entered the warehouse where it was held in check by 51 sprinklers.

Plastics Manufacturing

***Aug. 26, Rosslyn Station, Pa. Cargill, Inc. $500,000**

Synthetic resin. A congested group of 1-story buildings was badly damaged by an explosion and ensuing fire. The explosion oc-

**See Shipyards for fire in plastic hulled ship under construction.

Vic Polk Studios

An explosion of flammable vapors in and around the cutting and filtering building at the plastics manufacturing plant at Rosslyn Station, Pa., wrecked the sprinklered building and broke piping from which flammable liquids escaped. The burning liquid flowed to yard-stored drums and to a group of buildings.

Wide World

The largest industrial loss of 1955 occurred at the Whiting, Ind., oil refinery. Following a violent explosion at a hydroformer, flammable liquids ranging from crude oil to aviation gasoline were released from ruptured storage tanks and piping.

curred at 8:10 P.M. and is believed to have involved flammable vapors that had accumulated outside a sprinklered 1-story metalclad cutting and filtering building in which a synthetic resin was diluted with mineral spirits. Accumulation of flammable vapors in and around the cutting and thinning building was attributed to the high humidity and absence of wind on the day of the fire.

The explosion wrecked the cutting and filtering building and damaged aboveground flammable liquid storage tanks adjacent to the building. Spilled liquid ignited and flowed downhill to yard-stored drums of flammable liquids and into a group of unsprinklered buildings.

At the time of the explosion only three employees were at the plant and none of these was in the area where the explosion occurred.

Companies from 20 fire departments responded and eventually brought the fire under control although greatly hampered by the fact that yard hydrants, the only convenient water supply, were too close to the fire to be used.

Refineries — Petroleum

July 22, Wilmington, Calif. Wilmington Gasoline Co. $400,000

Gasoline absorption and compression plant. Rupture of a 6-in. pipe carrying butane under 500 psi from the process tower to the cooling tower was believed to have preceded an explosion and fire that damaged all outside processing equipment including towers, pressure vessels and piping. Congestion of equipment and lack of water spray protection contributed to the loss which would have been still greater but for two employees who shut valves at considerable danger to themselves.

Aug. 27, Whiting, Ind. Standard Oil Co. (Indiana) $16,000,000; 2 killed

Orthoflow fluid hydroformer. A violent explosion that shattered the 265-ft.-high hydroformer killed a three-year-old boy, destroyed two dwellings, damaged 180 others and caused extensive damage to the refinery site. Flammable liquids ranging from crude oil to aviation gasoline that were released from ruptured storage tanks ignited and caused an intense fire that involved approximately 80 storage tanks in the undiked tank farm. A plant employee died of a heart attack on reporting for fire duty.

The following "conclusions" were extracted from a detailed report of the fire published in the October 1955 QUARTERLY:

1. Insufficient spacing between hazard areas proved to be the primary cause of the large loss. With the development of many new processes in the oil refining industry, older refineries particularly are becoming overly congested. Industry must decide whether it is better to spend additional millions to secure proper plant separation or to be exposed to multi-million-dollar property losses and multi-million-dollar losses of production.

2. Puncturing of tanks and breaking of lines resulted in the release of large quantities of the contents of the tanks which burned and exposed other tanks in the tank farm area.

3. Lack of dikes and inadequate spacing between many of the tanks proved to be an insurmountable fire fighting problem.

4. The desirability of having an adequate and detailed disaster plan for industrial and public fire and emergency organizations was clearly indicated by the fire in an extremely congested and valuable industrial area.

5. The refinery's own unusually complete disaster plan proved its worth in many ways.

(a) The accurate and detailed newspaper reporting was handled from press headquarters established in the administration building.

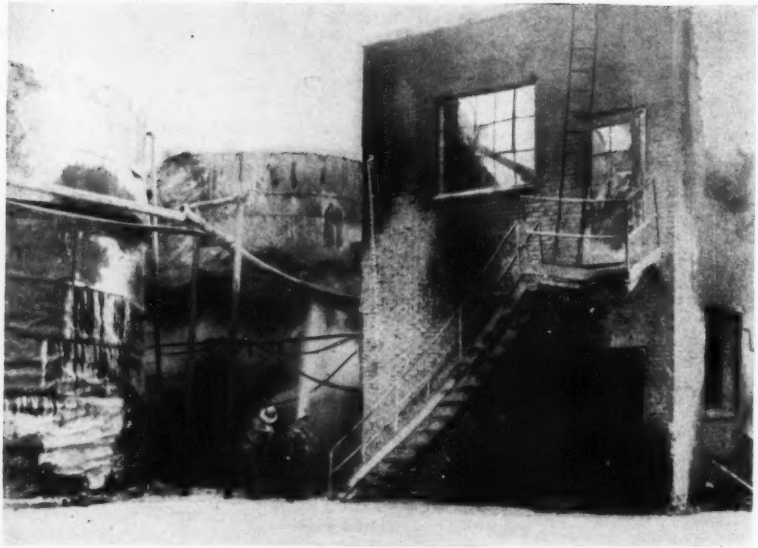
(b) The plant's competent fire marshal was in complete charge of the fire under the plant's emergency organization. This organization provided for maximum efficiency.

(c) The water system including fire pumps, water tanks, hose and pumpers proved the success of the preplanning and the value of such complete equipment.

(d) Two-way radios on the plant's fire apparatus and particularly the "walkie-talkies" provided instant communication with the fire marshal at fire department headquarters.

(e) The fire training of plant personnel, including plant management, proved to be invaluable.

(f) Previous visits to the plant by public fire departments and visits by the plant's fire marshal to public fire departments proved to be of value through the resultant mutual confidence and harmonious operations.



At this Warren, Pa., oil refinery an explosion occurred in an aboveground tank while it was being filled through a top connection. Congestion of buildings and tanks and absence of dikes were the primary factors responsible for the involvement of seven buildings and five 1,000-barrel tanks.

Minneapolis Fire Department

Several panels of siding were blown off by an explosion of hexane vapors at this Minneapolis, Minn., linseed oil extraction plant. Relief of pressure by the blowout of panels prevented damage to structural members and sprinkler piping but did not prevent fatal injuries to two of the 14 employees in the building.

6. The cooperation between the many paid and volunteer fire companies was noteworthy.

7. Police officials, Salvation Army, National Guard, American Red Cross and other officials are to be congratulated for the handling of the evacuation, housing and feeding of the 1,900 people for a period of four days. Traffic control in itself was a monumental task.

Oct. 30, Warren, Pa. United Refining Co. $1,000,000†

Oil refinery dewaxing tank. Congestion of buildings and aboveground tanks and the absence of dikes were the principal factors responsible for the destruction or damage of seven 1-story buildings and five 1,000-barrel aboveground storage and chilling tanks.

Preparatory to centrifuging wax from "bright stock," an employee opened valves to permit "bright stock" and naphtha to flow into a 1,000-barrel aboveground refrigerated tank through top connections. Filling had been in operation for only a few seconds when an explosion occurred in the tank that lifted its roof and spilled burning oil on the ground. The flowing burning oil involved two adjacent buildings and another tank in a very short time. The second tank also exploded, spilling its contents.

The plant and public fire departments responded promptly and did good work in saving several exposed tanks and buildings but were unable to prevent the burning liquid from flowing down a gradual slope through the plant causing three more tanks to rupture and igniting five more buildings. Heat from the ground fire caused unprotected steel supports for a 55-ft.-high all metal Bauxite burner to collapse accounting for a large percentage of the loss.

Ignition of an explosive vapor-air mixture by a static spark generated as the liquids were introduced into the chilling tank was the most plausible explanation of the initial explosion.

Refinery — Vegetable Oil

Feb. 14, Minneapolis, Minn. Cargill, Inc. $1,630,000; 2 killed

Solvent extraction of linseed oil. Two of a 14-man crew repairing a horizontal-type linseed oil extraction unit were killed when hexane vapors in the unit exploded. On February 9 the unit had been shut down because meal falling from a conveyor in the unit caused the conveyor to choke. After the trouble had been cleared on February 12 the unit was started and continued to operate until February 13 when a choke again developed. The next day a crew, wearing breathing apparatus, again opened up the unit and was in the process of transferring about 20 tons of hexane-laden meal in pails from one end of the unit to the other when the explosion occurred.

Several panels of metal building siding (fastened to steel framing by clip fasteners) were blown out, preventing structural damage to the building framing. Fire immediately enveloped the interior but spray sprinklers held the blaze in check until firemen could remove the men and complete extinguishment with small hoses equipped with spray nozzles.

Rubber Fabricating

Dec. 17, Atlanta, Ga. M. A. Ferst, Ltd. $526,000

Pencil erasers and leads. The large area 1-story brick, wood-joisted building destroyed by this fire was protected by standard watchman protection and an automatic chemical sprinkler system supplied by a 200-gallon soda-acid tank. At 2:55 A.M., thirty minutes after the watchman had punched his clock in the eraser manufacturing section, he discovered that area well involved in fire. The alarm was transmitted over a fire alarm box across the street after an attempt to telephone the alarm was abandoned because telephone wires were burned.

Fire was confined to the section of origin when firemen arrived but before hose streams could be placed in operation spread through unprotected openings in a division wall to the adjoining lead manufacturing section. Using eight 2½-inch lines and four ladder pipes firemen brought the fire under control before it could spread through unprotected openings in a division wall to a third section of the plant.

The alarm bell on the automatic extinguishing system was apparently out of order (the watchman did not hear the bell). The system operated but because of the hazard of occupancy the fire was too severe to be extinguished by a system employing small pipe sizes and

only 200 gallons of extinguishing agent. Soda-acid systems are designed for use in light hazard occupancies where adequate water supplies for a standard sprinkler system are not available. Considering the hose streams used by the fire department there was no water shortage in the vicinity of this plant.

Shipyards

Feb. 2, Bay City, Mich. DeFoe Ship Building Co. $305,000

Plastic hulled experimental minesweeper. Ten months of work on this 47-ft. craft, whose hull was being formed from a combustible plastic reinforced with glass wool, was wiped out when fire destroyed the 30,000 sq. ft. unsprinklered 65-ft.-high noncombustible building and its contents. The fire was discovered by the watchman at 1:34 A.M., 24 minutes after a guard had checked the building.

In addition to the fuel contributed by the combustible hull and forms, a large combustible fibreboard enclosure had been constructed around the hull. Driven by stiff winds, the fire had involved most of the undivided building before apparatus arrived. Poor hydrant spacing requiring long hose lays delayed fire department attack.

***Oct. 27, Lauzon, Que. Davie Shipbuilding Ltd. $2,272,000**

Foundry, carpentry and steel fabricating shops. Twenty-five 1- and 2-story wooden buildings at this shipyard were destroyed and four others suffered between 75 per cent and 90 per cent damage by fire. Eight of the buildings were sprinklered. Absence of a breeze was a principal reason that the fire did not spread into the town.

Forty-five minutes after the watchman toured the adjoining and communicating unsprinklered 1-story plate shop and plate storage areas fire was seen coming through the roof. All available plant personnel and the public fire department arrived in a few minutes but due to the combustibility of the buildings, lack of fire walls (most of the buildings involved constituted a single fire area 975 ft. long) and lack of sprinklers in the building of origin the fire spread rapidly out of control.

Sprinklers and yard mains were both supplied from a connection to public water mains. Yard mains could also be supplied by fire pumps from an adjoining Canadian Government dry dock, but because of leaky check valves at the city connection it was necessary to close the city connection before raw river water could be pumped into yard mains by

Oesterwinter

Some of the 29 buildings destroyed or damaged at the Lauzon, Que., shipyard fire were sprinklered, but unfortunately not the one in which the fire originated.

Argus Press

High-piled stock and substandard sprinkler protection (spacing substandard, piping small, sprinkler removed where fire started) contributed to the destruction of this automobile seat cushion factory at Owosso, Mich.

government pumps. Had it been possible to use the two supplies simultaneously and had the yard mains been large enough to handle the volume of water needed there might have been sufficient water to supply both yard hydrants and sprinklers. As it was, the large number of hose streams (18 were in operation at the height of the fire) left no water for sprinklers. Another very important factor responsible for the destruction of the sprinklered buildings was the lack of exposure protection. All of these buildings were combustible and all communicated directly with or were adjacent to unsprinklered buildings. Under such severe exposure conditions it is possible that even adequately supplied sprinklers would have been overpowered.

Textile Working

Jan. 3, Greenville, Ill. De Moulin Brothers and Co. $303,000

Lodge uniforms and equipment. Lack of sprinkler protection was responsible for destruction of the 35,000 sq. ft. storage section of this large-area 1-story brick, wood-joisted building. Segregation of the seven sections of the building by fire walls with double fire doors at openings prevented spread to five of the six other sections. A section adjoining the section of origin suffered fire damage to the roof structure when a wooden beam in the fire wall between the two sections fell, exposing a small opening in the wall.

When discovered by an employee at 1:10 P.M., fire was burning in combustible stock bins. The fire department was notified and fire extinguishers were discharged, but heat and smoke prevented effective use of these devices. Fire doors at all openings were then closed. On arrival firemen found the combustible contents, bins and roof well involved.

Feb. 10, Owosso, Mich., Mitchell-Bentley Corp. $750,000

Automobile seat cushions. Substandard sprinkler protection, high-piled stock, and unprotected horizontal and vertical openings were among the fire protection weaknesses that combined to cause the destruction of the fourth stories of both sections and the third and second stories of one of the two sections that comprised this sprinklered 18,000 sq. ft. 4-story brick, wood-joisted building.

The fire originated in the second story in an area where automobile seat cushions, cotton padding and foam rubber were stored almost to joists. Faulty operation of a suspended gas-fired unit heater around which the stored material was piled may have been the ignition source, although definite information on the cause is lacking due to the extensive damage.

Hearing the sprinkler alarm at 7:50 P.M., a plant watchman (in another building at the time) found the building heavily charged with smoke. He then operated a public fire alarm box but since the box was frozen the fire department was not notified until an outsider telephoned the alarm at 8:14 P.M.

Although hampered by dense smoke, firemen located fire in the stored cushions in the second story. Sprinklers were operating but because of the excessive height and size of piles, substandard spacing of sprinklers, small pipe sizes, and the absence of a sprinkler in the area where the fire started (it had been removed when the unit heater was installed) sprinklers could not extinguish the fire.

Fire had also extended through the ceiling to cushions, padding and foam rubber stored directly above in the third story. Sprinklers were operating here also, but, as in the second story, poor stockpiling practices and substandard sprinkler protection prevented control. During the early stages, there was probably an adequate water supply for the relatively few sprinklers operating, but as the fire spread through congested stock on the second, third and fourth stories of the section of origin and to the fourth story of the adjoining section (fire doors blocked open) the large number of sprinklers that fused overtaxed the water supply (75,000-gallon gravity tank, two connections to public mains and 750 gpm pumper connected to fire department connection). Fire also spread through a conveyor opening to the adjoining section at the second story level, but did not gain a foothold. Using ten 2½-inch lines firemen controlled the fire in 8½ hours.

Feb. 18, Newark, N. J. Atlantic Cotton Felt Co. $268,000†

Cotton felt. At 3:07 A.M. firemen were summoned by an outsider for fire that originated on burlap-wrapped bales of cotton linters stacked almost to sprinklers in the third story of the 6,600 sq. ft. 4-story brick, wood-joisted building. Sprinklers were confining fire to an 800 sq. ft. area, although high piling prevented water from reaching the seat of the fire near the floor.

Firemen extinguished the fire with hose streams, threw smoldering bales into the yard, shut off sprinklers and checked the fourth floor to be sure fire had not extended through small openings to that area. Apparently a smoldering fire was hidden from notice since an hour later, before sprinklers had been put back in service, fire flashed over baled linters in the fourth story. The sprinkler valve was opened, but because all 80 sprinklers in the fourth story had already fused, the water supply was inadequate.

Attempts to pump into the sprinkler system were futile when one connection broke during efforts to remove the rusted cap, and the other could not be used because of a leaking check valve. The fire was extinguished with hose streams.

***Feb. 19, Philadelphia, Pa. Craftex Mills, Inc. $391,000**

Cotton weaving. Sparks escaping from an outdoor incinerator because the incinerator door had not been closed tightly, ignited rubbish adjacent to a 30 ft. by 19 ft. sprinklered 1-story wood-framed, metalclad passageway that connected two sprinklered multi-storied brick, wood-joisted mills. Fire entered the passageway igniting stock (material in transit between the two mills was stored in the passageway) and since sprinklers in the passageway had been shut off to prevent freezing, the fire burned unnoticed until the watchman saw smoke at 7:30 P.M.

The watchman neglected to turn on the sprinkler valve and consequently the fire spread through unprotected doorways to the sprinklered first stories of the two mills and also entered an unsprinklered elevator shaft in one of them. Sprinklers in the first stories held the fire in check until firemen arrived, but in the meantime fire had spread up the unsprinklered elevator shaft and mushroomed into the third story because nonautomatic fire doors on the shaft had been left open. The fire was prevented from spreading very far into the third story by the operation of about 63 sprinklers. Fire department hose streams completed extinguishment.

***March 19, Sloatsburg, N. Y. Ramapo Pierce Dye Works, et al. $1,800,000**

Cotton dress cloth washing, sizing, tentering and drying. Two of the three buildings comprising the one large industrial plant in the town were destroyed by fire that broke out when cotton cloth fell from a gas-fired tenter frame and ignited. Because of the heavy accumulation of lint on the ceiling, the fire flashed across the lint and entered one of two unsprinklered combustible and flimsily constructed 3 ft. by 3 ft. ventilating ducts that extended through the roof before sprinklers in the first story had time to open. Sprinklers later fused, but by then the fire was raging

in the lint-coated duct and soon burned through the duct wall and entered the second story where flash fire conditions were also present. Many sprinklers fused, but it is doubtful if water discharged because the poor primary supply (3-mile-long 8-inch main) must already have been overtaxed by sprinklers operating in the first story. The secondary supply (1,000 gpm steam fire pump) was non-existent because the night engineer could not operate the fire pump.

The fire spread rapidly through the undivided 40,000 sq. ft. 2-story brick, plank and timber building of origin and had jumped a narrow alley to a sprinklered 3,700 sq. ft. 1-story building before public fire protection could be mobilized.

A detailed report was published in the July 1955 NFPA QUARTERLY, pp. 61-64.

May 27, Collinsville, Mass. American Woolen Co. $1,000,000

Blankets. Equipment and stock on the sixth floor of this 6-story brick, plank-on-timber mill were badly damaged by fire and the contents of lower stories were heavily damaged by water when fire broke out at a feed hopper of a wool card. At the time a mixture of 90 per cent rayon and 10 per cent nylon was being processed which caused lint to collect on all exposed surfaces. The fire spread rapidly over the lint coating and could not be controlled by employees using fire extinguishers before they were driven from the area by fire.

The building was sprinklered, but because of long runs of small pipe sizes and a 20 minute delay in starting the fire pumps, there was not enough water to supply the sixth story sprinklers (all of which had fused) and the fire burned out of control until extinguished by twelve fire department hose streams.

***June 29, Canton, Ga. Cantex Manufacturing Co., et al. $1,000,000; 1 killed**

Corduroy cloth finishing. Failure to extend sprinkler protection to a loading platform (as recommended) and to provide a lint collecting system for all of the 3-story brick, wood-joisted building was responsible for the death of an employee, destruction of five buildings and damage to three others. Originating beneath the unsprinklered wooden platform in the rear of the otherwise sprinklered building, fire was drawn into the basement and first floor through rear windows by the action of exhaust fans mounted in windows at the front of the building.

Flames spread with great speed over a large accumulation of lint on ceilings, walls and machinery, opening so many sprinklers almost simultaneously that the single source water supply (6-in. city main) was overtaxed. Before firemen arrived fire had also extended to the lint-covered third story through unprotected openings. All except one of the 60 employees in the building escaped before flames cut off exits. The one victim was trapped in the first story.

Intense heat ignited exposures adjoining the west side of the building of origin. Collapse of the east side wall allowed fire to spread to exposures to the east. Weak public water supplies prevented effective fire fighting. During the early stages, the water supply from hydrants was fair, but the supply weakened rapidly when more pumpers arrived. Water escaped through a broken 6-in. sprinkler pipe during the fire since heat, and later a collapsed wall, prevented anyone from closing the sprinkler control valve.

***Aug. 20, Mechanicsville, Conn. Uncas Printing and Finishing Co., et al. $5,050,000**

Cotton bleaching and finishing. While this 4-story brick, plank-on-timber plant was surrounded by flood waters that reached almost to the second story, fire broke out in the second story. Sprinklers supplied by a 165,000-gallon open reservoir on a hill 1,600 ft. away held the fire in check until the reservoir went dry, after which the fire spread out of control.

Flames also got beyond a substandard fire wall and destroyed the adjoining 4-story building occupied by the Putnam Finishing Co. Sprinklers in the building were supplied by the same reservoir that supplied sprinklers in the Uncas Printing and Finishing Co. plant. For detailed report see October 1955 QUARTERLY (see photo next page).

Sept. 12, Towanda, Pa. Towanda Textiles, Inc. $750,000

Silk twisting, quilling, weaving, sizing. On noticing smoke coming through the floor from the basement storeroom at 1:48 P.M., employees tried to give the alarm, but on finding the telephone dead immediately evacuated the building without making an attempt to locate and control the fire until the fire department arrived. Responding to a neighbor's alarm at 2:05 P.M., firemen found the unsprinklered 26,000 sq. ft. 1-story brick, wood-joisted building charged with smoke. Five

Wide World

Fire broke out in the second story while this Mechanicsville, Conn., textile plant was surrounded by flood waters. Sprinklers held the fire in check until the water supply, a 165,000-gallon reservoir, went dry (see story on previous page).

minutes later a smoke explosion occurred and flames enveloped the undivided interior.

Had the building been sprinklered or had a well-trained and equipped plant fire brigade been maintained to locate the fire, ventilate the building and fight the fire pending arrival of professional firemen, the mill probably could have been saved.

Dec. 14, Freetown, Mass. Terrybrook Dyeing & Finishing Co. $400,000

Cloth finishing. Three-fourths of this 40,000 sq. ft. 2-story brick, plank-on-timber mill was destroyed by fire because sprinkler protection had not been placed in good operating condition by the new building owners after acquiring the run-down mill property. Among the weaknesses in the system directly responsible for the disastrous loss was the empty elevated storage tank (probably drained to prevent freezing since an ordered tank heater had not arrived) and a serious leak at the check valves in the fire pump discharge which was "corrected" by keeping the discharge valves closed. While checking the ruins investigators found a 2-in. drain on a main riser three-fourths open. If this was open before the fire it also would account for the empty tank.

The fire originated in the vicinity of a cloth dryer on the second floor and had made considerable headway before discovery by the two employees on the first floor at 1:45 A.M. The plant fireman-watchman was notified but because of panic or for some other unknown reason did not start the fire pump and open the discharge valves but instead shut down the boiler and left the plant.

By making a stand at openings in a masonry division wall firemen were able to save one-fourth of the building.

Woodworking

Boats

***March 26, Peshtigo, Wis. Thompson Bros. $271,000**

Wood-framed, canvas-covered boats. Destruction of this 16,200 sq. ft. 3-story wooden building was due to the absence of automatic protection or watchman service to assure prompt detection of any fire that might occur during nonoperating periods. The fire originated in the not-cut-off painting department on the first floor and had spread throughout the undivided building before discovery by a neighbor at 5:25 A.M.

Wind-carried embers ignited a wooden garage but fire fighters were successful in saving an exposed petroleum products distribution plant. Although not a serious factor in the extent of damage, corks that somehow got into city mains clogged nozzles on 1-inch and 1½-inch hoses, but not the 2½-inch.

Boxes

Feb. 12, Baltimore, Md. H. D. Dreyer and Co., Inc. $325,500

Soft drink boxes. On entering the sprinklered 3-story brick, wood-joisted building at 1:30 P.M., 1½ hours after employees had gone home for the weekend, the watchman found the first floor heavily charged with smoke. Firemen, summoned by the watchman, found fires burning on the first and third stories. Sprinklers had extinguished the first story fire before hose streams were in operation and, by the time two 2½-inch hoses had been taken to the smoke-filled third story, it appeared that the fire had been extinguished there also.

The sprinklers were ordered shut off but when windows were opened to ventilate, fire again broke out and spread rapidly. In the 20 minutes before sprinklers were again turned on the fire had gained such headway in the second and third stories that about 345 sprinklers opened, overtaxing the single source water supply. With the water supply augmented by an engine pumping into the fire department connection, sprinklers in the second story were of value in bringing the fire under control but were useless in the third story due to broken piping.

The roof and top story were destroyed and the second story was badly damaged. Water damage in the first story was heavy.

Building Supplies

***June 4, Newark, N. J., J. Walter Caves, et al. $350,000**

Wood building supplies manufacture and storage; cosmetic factory. Since the 3-story combustible woodworking mill was surrounded by lumber sheds and piles of lumber, and protected by a poorly supplied sprinkler system, it was not surprising that it was destroyed by fire that was beyond control in an exposing unsprinklered lumber shed before discovery.

The fire originated during a Saturday afternoon and since no watchman protection was provided for the plant, the fire had made considerable headway before discovery and was being driven by brisk winds through another shed and lumber piles surrounding the mill. During the first 15 minutes of fire fighting a favorable wind allowed fire fighters to keep the fire from the mill but when the wind shifted, flames quickly enveloped the asbestos-shingled exterior and burst into all stories of the mill through plain glass windows.

It is estimated that more than 300 sprinklers on the dry pipe sprinkler system (in-

Kalamazoo Gazette

At Kalamazoo, Mich., on Oct. 26, fire broke out in a sash and door plant while 15 men were at work in and around the plant. No one happened to be in the second story of this unsprinklered building where the fire started.

stalled in 1895) opened almost immediately and that in a very few minutes all 641 on the single dry pipe valve had fused, overtaxing the water supply and rendering sprinkler protection ineffective. Hose lines directly connected to hydrants could get no water due to the previous demand by sprinklers. Eventually 2½ inch hoses supplied from distant hydrants and from a canal brought the fire under control.

Fire broke about 700 windows in a 3-story brick cosmetic plant 40 feet from the fire. Small fires started in stock were extinguished by employees using fire extinguishers and by sprinklers. Excessive water damage resulted when excited employees forcibly opened a large number of sprinklers.

Oct. 26, Kalamazoo, Mich. Grand Rapids Sash & Door Co. $258,000

Window sashes and doors. The presence of employees does not necessarily mean that a fire will be discovered promptly. In this instance 15 men were at work in and around the 200 ft. by 200 ft. 2-story wooden building when fire originated in the electric motor near the roof in the second story. Since no one was in this area, the fire developed unobserved until seen by an employee at 3:08 P.M., by which time it was spreading rapidly through the unsprinklered and undivided second story. A further delay in fire department response resulted because the wrong department was called. When the first engine company arrived, the building was entirely involved, and a row of private garages that backed up to the plant was burning. A row of dwellings was scorched but saved by fire department hose streams.

Cork Insulation Board

***Aug. 5, Kearny, N. J. United Cork Companies $2,000,000†**

Cork insulation board. Four days before fire practically destroyed four mostly 1-story brick, wood-joisted buildings (total ground floor area approximately 45,000 sq. ft.), a 12-inch public main serving the plant had been put out of service to permit repair of a damaged valve. Water supplies for operating and fire protection uses were thereby reduced to a 3,000-ft.-long 6-inch and 8-inch main and a 1,000 gpm steam-driven fire pump. The fire department had not been advised of the shutoff of the 12-inch main until the day of the fire and the plant had never been advised.

The fire broke out in an overhead fume duct from cork board presses when covers were removed from the ducts for cleaning purposes. Spontaneous ignition of hot resin residue was the reported cause. An attempt to put out the fire with a standpipe hose was abandoned when only a dribble of water was obtained. Feeding on cork dust, fire spread to the wood roof where sprinklers on the dry pipe system fused but here again the impaired water supply rendered the fire protection ineffective and the fire spread rapidly beneath the roof to most of the 126-ft. by 260-ft. building.

The steam fire pump, which took suction from a river, was started up about five minutes after the fire started and operated for 15 minutes, and then stopped because it had been necessary to shut down steam boilers due to inadequate feed water. (Similar shut downs of boilers had been necessary intermittently during the four days prior to the fire while the 12-inch main was out of service.)

During the 15 minutes the pump operated sprinklers were of no value since the three fire department hose streams being supplied from yard hydrants took all available water. None of the hoses was connected to the sprinkler system. After the fire pump stopped no water was discharged on the fire during the 15 minutes required to relocate pumpers to take suction from the river.

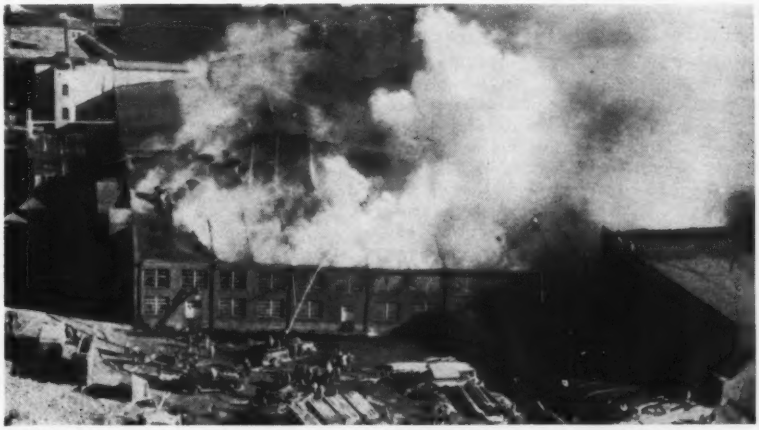
In the meantime fire had spread to three adjoining sprinklered buildings through fire wall openings that were unprotected or that were protected but the fire doors were blocked open. Two large piles of raw cork, about 100 ft. from the building of origin, were ignited by embers and destroyed. The fire was finally brought under control with thirteen fire department hose streams.

Furniture Factories

Jan. 7, Lewisburg, Pa. Lewisburg Chair and Furniture Co. $500,000

Spray finishing, rubbing, packing and storage of wooden furniture. The roof of this 25,000 sq. ft. sprinklered 2-story brick, wood-joisted building was burned off by fire that originated in the not-cut-off paint spraying area in the second story. Ignition of paint vapors by sparks from an electric motor was the cause.

Employees attacked the fire with a 15-pound carbon dioxide extinguisher and a small hose but soon had to drop this equipment and flee as the fire flashed through the undivided second story feeding on paint residue



Wide World

Ignition of paint vapors by sparks from an electric motor started this $500,000 fire in a Lewisburg, Pa., furniture factory. Almost simultaneous operation of 450 sprinklers overtaxed the sprinkler system.

on two 150-ft.-long conveyor lines and on accumulated flammable vapors. The fire spread so fast that a fire door 120 feet from the point of origin closed less than three minutes from the time of origin. The building was protected by a wet pipe sprinkler system supplied by a 6-inch street main. Almost simultaneous fusing of the 450 sprinklers in the second story overtaxed the system due to inadequate pipe sizes.

Three buildings communicated with the building of origin through doorways at the second story level. Double fire doors at all openings closed before fire spread through these openings. The only extension to the exposures was through a small hole in a fire wall from which two bricks had been removed. Flames that penetrated the opening were extinguished by a sprinkler on the other side.

***Nov. 30, Hazelwood, N. C. Unagusta Manufacturing Corp. $775,000**

Wooden bedroom furniture. Two adjoining 2-story wood-frame, metalclad buildings with a total ground floor area of 52,820 sq. ft. were destroyed by this fire. Both buildings were protected by dry pipe sprinkler systems supplied by two sources, one a 75,000-gallon gravity tank that maintained 26 psi static pressure on the top line of sprinklers, and the other a 6-inch circulating city main with a static pressure of 65 psi at the riser. As demonstrated by this fire these combined supplies provided water at satisfactory pressure and volume for a relatively few sprinklers but pipe sizes were not adequate to supply the large number of sprinklers (290) that were rapidly fused as fire flashed through the undivided second story of the building of origin.

Since such a fire could have been anticipated in an area occupied for spray finishing and containing large quantities of freshly painted furniture the unsatisfactory sprinkler performance must be attributed to improper design of the system for the hazard to be protected.

The fire broke out in the undivided 17,800 sq. ft. second story of the finishing and storage area where furniture was being sprayed, finished and dried. Employees had been smelling smoke for about an hour and the maintenance man was checking wiring for possible overheating at 3:15 P.M. when fire broke out in the vicinity of the combustible fibreboard drying room. Flames spread so rapidly over furniture on conveyors and spray residues that all employees immediately fled.

Water discharged from sprinklers during the first few minutes but as more and more sprinklers fused, the water supply was overtaxed and the protection was rendered ineffective. As the fire spread through the building it was intensified as drums of flammable liquids ruptured and it soon became evident

to the first arriving fire fighters that the finishing and storage building could not be saved.

A fire wall with fire doors on each side of each opening and with a 3-ft. parapet separated the factory and veneer building from the building of origin. Fire doors closed and performed satisfactorily but fire that was carried over the parapet by a 20 mph wind ignited the built-up roof covering of the factory and veneer building. The fact that both roofs sloped downward toward the fire wall was probably a factor in the ineffectiveness of the parapet. Flames spread rapidly along the roof and in minutes the entire building was afire.

Hardwood Turning

***Feb. 7, Woodstock, Me. Stowell Silk Spool Co. $250,000†**

Birch spools, typewriter rolls, toys. Fire that destroyed this sprinklered 4,800 sq. ft. 2-story wooden mill, communicating wooden boiler room, communicating metalclad dry kiln and detached sawdust house illustrated two reasons why boilers should be segregated in fire-resistive rooms. First, the fire originated in the boiler room and spread through unprotected openings to the dusty interior of the mill. In the second place, the steam fire pump in a detached pump house was supplied steam from the boiler room. Since fire prevented refueling the wood-fired boiler, the boiler fire went out and the fire pump stopped.

Sparks issuing from a crack in the boiler insulation were the probable cause of the fire that was spreading across the boiler room ceiling when discovered by the watchman at 5:45 P.M. The fire spread rapidly through the dusty first story and through open stair, elevator and conveyor shafts to the second story and attic. Sprinklers, supplied by a 45,000-gallon elevated tank, and the 500 gpm steam fire pump appeared to be holding the fire in check in the first story when firemen arrived but were having little effect on the fire in the second story and attic, probably because of the large number of heads operating in the first story. The water supply for sprinklers was further weakened when hose streams were connected to yard hydrants.

About 20 minutes after the fire started the fire pump stopped. The fire thereafter burned more intensely and when the elevated tank was emptied about 20 to 25 minutes later the whole building burst into flames. The fire was extinguished by water pumped to the scene from a brook ¼ mile away.

Plywood

May 15, near Conway, S. C. Stilley Plywood Co., Inc. $686,000

Plywood panels. Lack of division walls and sprinklers were responsible for destruction of this 70,000 sq. ft. 1-story wooden building. Fire of undetermined cause was discovered by the boiler fireman in the boiler house at 11:45 P.M., ten minutes after the watchman reportedly went through the plant and found everything in order.

When the Volunteer Fire Department from Conway arrived, the undivided structure was beyond saving. Prior to arrival of firemen the three employees on the premises had attempted to fight the fire with standpipe hoses but had to abandon this plan when it was found that the plant's small gasoline-driven fire pump was out of gasoline.

Saw and Planing Mills

***May 6, Marysville, Wash. Weiser Lumber Co. $325,000**

Cedar saw and planing mill. At 5:58 P.M., while repairing a log haul, an employee noticed flames under a planer. Flames spread with great speed through the dusty and unsprinklered 1-story wooden mill and burst into the communicating boiler room just as the employee finished telephoning the alarm.

Before being controlled by the local volunteer fire department, assisted by departments from surrounding towns, the fire had consumed 210,000 sq. ft. of congested wooden buildings and yard-stored lumber.

***May 12, New York (Brooklyn) N. Y., Varick Planing Mill, et al. $2,000,000**

Planing mill, saw works, auto repair shop, lumber yard, woodworking plant, paint mfg. Originating in a dust collector in the planing mill (one report states that a dust explosion occurred in the collector) fire destroyed two blocks of congested combustible construction and threatened to develop into a major conflagration before being controlled. The fire was reported at 1:09 P.M. and spread with incredible speed involving the 30,000 sq. ft. 1-story wooden planing mill, the 7,000 sq. ft. wooden 1-story saw works, the 1,400 sq. ft. wooden repair shop and a 4,600 sq. ft. paint works before the first piece of fire apparatus arrived.

Wind-carried sparks carried the fire across the street where yard-stored lumber and sev-

United Press

At Brooklyn, N. Y., May 12, a $2,000,000 fire originated in a dust collector in an unsprinklered planing mill. Flames spread through two blocks of congested combustible buildings and yard-stored lumber, requiring 55 2½-inch hose streams to bring the fire under control.

eral congested wooden buildings were destroyed. Forty engine companies supplying 55 2½ inch hoses were used to bring the 2-block fire under control and extinguish several small fires started in grass and on barges.

***Aug. 20, Oil City, Pa. Farley Lumber Co., et al. $460,000**

Planing mill; truck body and folding bed mfg.; advertising and farm machinery storage. Two adjoining and communicating 4-story brick, wood-joisted buildings, each 200-ft. by 60-ft. in area, were destroyed by fire that originated in the first story of one of the buildings in the vicinity of an electric switchboard. The fire broke out on a Saturday afternoon when all tenants had closed for the weekend, and since there was no automatic or watchman protection the fire had made considerable headway before discovery at 4:35 P.M. Despite the delayed detection, firemen believe they could have saved part of the buildings had it not been for the poor water supply from long 4-inch and 6-inch mains.

Fire spread up through open stair and elevator shafts and spread laterally through numerous unprotected openings in fire walls.

The buildings had formerly been sprinklered. Two years before the fire, piping had been removed from the upper two stories. The remainder of the system had been shut off but a control valve in the yard was supposed to be turned on in case of fire. The fire department apparently had not been advised of this makeshift arrangement.

Aug. 21, Rainier, Ore. Van Vleet Lumber Co. $862,000

Sawmill. Sparks from a welding torch being used to make repairs to a log carriage started fire that destroyed 62,500 sq. ft. of combustible sawmill buildings. A well-trained plant fire brigade, strong private water system and a heavy wooden subfloor bulkhead were features of the private fire protection at this large mill that, in combination with public fire protection, resulted in saving the adjoining planing mill and cargo dock. In fact, the only major fire protection weakness was absence of sprinklers. Had there been a sprinkler system designed to cope with hazards inherent in sawmills, it is quite probable that the fire would have been controlled and extinguished before spreading beyond the point of origin.

When first noticed by the welding crew, the fire was at the base of the log carriage and in the subfloor space. Efforts were made to control the fire with standpipe hoses and dry chemical and carbon dioxide extinguishers but the fire suddenly flashed along the dusty and

Oregon State Fire Marshal

A bulkhead in the subflow space was a major factor in preventing spread of fire from the sawmill (foreground) at Ranier, Ore., to the dock in background loaded with lumber awaiting shipment.

oil-soaked timbers in the mill and beneath the flooring forcing employees to drop the hoses and run.

The several public and private fire departments that responded promptly managed to surround and confine the fire before it spread to the planing mill and to the dock loaded with lumber awaiting shipment. Major credit for preventing spread of the fire from the subfloor space of the sawmill to the adjoining substructure of the wooden dock should go to a bulkhead constructed of 4-in. by 12-in. timber at the boundaries of the sawmill.

***Sept. 10, Vancouver, B. C. A. & M. Sawmills, et al. $506,000**

Sawmill; television sets and household furnishings warehouse; garage containing 20 lumber carriers. Sparks from cutting and welding operations by millwrights during the day were believed responsible for fire that originated near the sawmill runway. With no watchman or automatic fire protection, the fire smoldered undetected after the mill closed for the night and had entered and spread beyond control in the 40 ft. high 60,000 sq. ft. wooden mill before discovery by an outsider at 10:51 P.M.

Radiant heat and wind-carried embers ignited the combustible and unprotected garage and warehouse.

Oct. 21, Flagstaff, Ariz. Southwest Lumber Mills, Inc. $1,500,000

Planing mill with rough and slick storage. Less than a year after this 165,000 sq. ft. 1-story steel-framed, metalclad building (wood roof deck) was constructed, it was destroyed along with its contents of 3½ million board feet of lumber. Part of the responsibility for this loss can be placed on those who decided against sprinkler protection for the building (several other buildings were protected). Whoever decided that the watchman's tour need not take the watchman into the saw filing room also shares a part of the responsibility for this loss since the fire originated in this room and was not discovered by the watchman until it was well advanced. In fact flames broke through the roof as the watchman ran to telephone the alarm at 3:12 A.M.

Realizing that their principal concern was exposure protection Flagstaff firemen, later joined by men of the plant fire brigade as they responded from their homes, set up a water curtain with hose streams supplied from yard hydrants and were able to keep the fire within the building of origin.

Nov. 30, Daisy, Ky. W. M. Ritter Lumber Co. $297,500

Sawmill. Delayed discovery, lack of automatic fire protection, and combustible construction were the factors primarily responsible for the destruction of this 2- and 3-story wooden sawmill. Although a watchman made hourly tours of the several buildings at the plant, fire was first discovered by the plant superintendent at 5:50 P.M. The plant fire brigade responded promptly but the fire spread so rapidly that their efforts were confined to saving exposed buildings. With adequate water supplies and equipment they were successful and by the time the firemen arrived from Hazard 20 miles away (Daisy had no fire department) the fire was under control.

The 50 Largest Store Fires of 1955

The 50 "large loss" store fires in 1955 were four less than the record-breaking 54 in 1954. Three persons were killed (including 1 fireman), 146 were injured (140 firemen) and the damage totalled $26,124,000. More than half of these fires (54 per cent) occurred in four occupancies: furniture stores (9), department stores (7), supermarkets (6) and clothing and dry goods stores (5). In 1954 these same four occupancies accounted for 55 per cent of the large loss store fires.

Complete sprinkler protection, which not only prevents large loss store fires but also provides protection for the lives of customers and employees, was not provided in any of the 50 stores involved in large loss fires in 1955. Partial protection was installed in the basements in two instances (department store, Lowell Mass., March 17, and clothing store, Chicago, Ill., July 15) but in neither case did the fire originate or extend to the basement.

Delayed discovery has always been a prominent feature of large loss mercantile fires. Last year was no exception — 83 per cent were discovered only after an extended period of burning. None of the stores were protected by an automatic fire detection system and only two had watchman service. Outsiders were the first to discover 32 of the fires. In one of the two instances where watchman service was provided (clothing store, Chicago, July 15) the watchman was not the first to detect the fire and in the other (food store, Trevose, Pa., Nov. 11) the fire had gained considerable headway before discovery by the watchman.

A department store fire Sept. 24 at Winchester, Va. is an example of a de-

United Press

One out of three large loss store fires in 1955, including this clothing store fire at Carbondale, Pa., Feb. 4, spread to neighboring buildings. Delayed discovery was another feature of 1955 large loss store fires illustrated by this fire at Carbondale.

layed discovery fire that occurred while customers and employees were present. This same fire should be a warning of the threat of fire to the life safety of customers and employees in unsprinklered buildings.

Thirty-eight buildings in which these fires occurred were brick, wood-joisted construction, eight others being all wood, three noncombustible and only one fire-resistive. Among the notable structural weaknesses in these buildings contributing to fire spread were 50 instances (in 34 fires) of unprotected horizontal openings, including 18 division walls with unprotected openings or some other vital weakness, 13 large undivided attics, basements and other areas in obvious need of subdivision, 12 nonfirestopped concealed ceiling spaces, and seven instances of combustible interior finish. Eighty per cent of the fires occurred in multi-storied buildings. In 33 fires, flames spread to other stories because there were 44 specific instances of unprotected vertical openings in the buildings in which these fires occurred. Chief among these were 21 open stairways and eight open elevator shafts.

Poor party wall construction (continuous joist sockets, substandard parapets, etc.) was the principal reason that one out of every three fires in stores spread to neighboring buildings.

Clothing and Dry Goods Stores

***Jan. 28, Philadelphia, Pa. Sterling's Children's Wear, et al. $504,000**

Wholesale clothing. Two abutting buildings were badly damaged by fire that was beyond control when discovered by a private patrolman at 4:27 A.M. The fire originated above the first story ceiling of an unsprinklered 2-story brick, wood-joisted building. Defective wiring was the reported cause. Developing undetected above the ceiling, the fire eventually spread through the building via nonfirestopped walls and other unprotected openings. Spread to the adjoining 4-story building was by means of continuous joist sockets in which joists of both buildings rested.

***Feb. 4, Carbondale, Pa. Nolan Men's Store, et al. $1,824,500**

25 stores, 16 apartments, 5 offices, 1 dress factory. A block of 2- and 3-story buildings principally of combustible construction and without exposure protection were swept by fire that was beyond control in a clothing store when discovered by a passerby at 4:00 A.M. The Carbondale Fire Department has refused to submit a report on this fire, which suggests that weaknesses in the available public fire protection may have contributed to the extent of damage (see photo previous page).

July 15, Chicago, Ill. Maurice L. Rothschild and Co. $1,532,000†

Men's and women's clothing. The need for automatic sprinkler protection for fire-resistive buildings with combustible contents was demonstrated in this fire. Sparks from a welding torch that had been used to install air conditioning equipment were the probable cause

Chicago Tribune

Absence of sprinklers allowed fire to spread through the top story of this 12-story fire-resistive Chicago clothing store.

An asterisk (*) before a listing of a fire indicates fire spread to other buildings.

A dagger (†) after a loss figure indicates that the figure includes an insured business interruption loss.

of fire that originated on the roof of this 192-ft.-high, 12-story fire-resistive building.

The fire entered the top story through a roof opening that had been made for air conditioning equipment, and was not discovered by the contractor's crew. When smoke was seen billowing from top story windows by outsiders at 6:51 P.M. the fire was spreading through combustible shelving, stock and partitions in the top story. Firemen summoned by the outsiders arrived as the watchman was starting up through the building on his first supervised round of the night, an hour after the store closed.

The first engine companies connected three 3-inch hoses to the standpipe connection and stretched hoses from standpipes on the eleventh floor, but these lines could not be advanced into the twelfth story because of the heat and smoke. Two water tower streams were directed at the fire but due to the height of the building water reached only to eleventh story windows.

Early in the fire, flames spread to the elevator penthouse and put elevators out of service. Two of the cars plunged to the basement seconds after firemen had used them to get themselves and equipment to the fire area. The fire was eventually controlled with standpipe-connected hoses and hoses connected directly to pumpers. These hoses were directed at the fire from a rear stairway and from fire escapes.

Fire damage was confined to the twelfth story and elevator penthouse. Water and smoke damage on lower floors was so heavy that the store was closed for 14 days.

Nov. 30, Atlanta, Ga. New York Stock House, et al. $395,000

Ladies apparel store, sportswear store, millinery mfg. Originating in the ladies apparel store occupying the first story, fire burned for some time in the 5-story brick, wood-joisted building before being discovered by a passerby at 12:24 A.M. No automatic or watchman protection was provided.

When discovered, flames had eaten through a wooden enclosure around a passenger elevator shaft and had spread via the shaft to the third, fourth and fifth stories where large quantities of textiles used in making hats contributed additional fuel. Rolling fire doors on the elevator shaft at the second story level prevented fire from spreading from the shaft into the second story.

***Dec. 17, Sorel, Que. Vogue Lingerie Shop, et al. $300,000**

Eight stores, several apartments. At 4:30 P.M., while the lingerie shop was in operation, fire broke out at a suspended ceiling furnace in the first story of this 6,600 sq. ft. unsprinklered 2-story brick, wood-joisted building. All occupants escaped safely as the flames spread rapidly through the first story and followed nonfirestopped wall space and stairways to the second story and roof. Firemen were bringing the fire under control at 8:00 P.M. when the wind shifted and carried heat and flames against an exposed wall of an adjoining 3-story brick, wood-joisted building. Fire entered this building through a plain glass window at the third story level. Absence of an aerial ladder was given by the fire chief as the reason the exposure could not be saved.

Conflagration

April 10, Bowling Green, Va. Conflagration $600,000

Nineteen buildings housing 25 businesses destroyed; five buildings damaged. Originating in a small wooden barn containing hay and two cows, fire spread rapidly to an adjacent automobile garage and salesroom and was soon spreading to other 1-, 2- and 3-story combustible buildings on both sides of a main street in the business district (photo p. 326).

Local firemen responding at 2:15 P.M. were immediately confronted with a fire too big for any small town fire department and called for help that eventually brought 35 pieces of apparatus to the scene from as far as 38 miles away. Water carried to the scene from ponds by the equipment was a great aid in eventually bringing the fire under control.

Among the lessons was the need for coordination among mutual aid companies, the need for a strong water supply (the 60,000 gallon elevated tank went dry at 3:30 P.M.) and the conflagration potential of a mercantile district of combustible construction.

Department Stores

Jan. 31, Frederick, Md. J. C. Penney Co. $250,000

Store with 14 vacant apartments on upper floors. At 4:55 A.M. the janitor of the adjacent city hall saw smoke coming from around windows and doors of the store occupying the first floor, and gave the alarm. First arriving firemen found the building heavily charged

with smoke. Fire spread rapidly when the building was opened.

Inadequate manpower due to slow response of volunteers hampered effective fire fighting during the early stages. Unpierced masonry fire walls prevented spread to exposures.

The 3-story brick, wood-joisted building had no automatic or watchman protection and was unoccupied at the time since all apartments had been vacated preparatory to alterations.

Mar. 23, Millerton, N. Y., Delson Co., et al. $350,000

Department store, telephone exchange, public library, three offices. Lack of watchman and automatic fire protection allowed fire to develop in the first story department store for an estimated 30 minutes before the two telephone operators at work in the second story smelled smoke and gave the alarm. By then the fire had made such headway that the girls had to be rescued over ladders. Fire spread

Wide World

The conflagration potential of a mercantile district of predominantly combustible construction was demonstrated by this fire at Bowling Green, Va., April 10.

Enid News and Eagle

This department store fire at Enid, Okla., originated in the unsprinklered basement where it smoldered for a considerable period before being noticed by a cab driver. As soon as the building was ventilated the accumulation of hot fire gases burst into flame. Heat permeated the 12-inch fire wall and ignited merchandise stored in the top story of the adjoining 3-story building, but this fire was put out by 3 sprinklers.

rapidly through unprotected stairways and other vertical openings in the 110 ft. by 90 ft. 2-story wooden building to the undivided and inaccessible attic.

***April 15, Enid, Okla. J. C. Penney Co., et al. $285,000**

At 4:20 A.M. a taxi driver saw the reflection of fire in the sky and telephoned the alarm for fire that must have been smoldering in the basement for a long period before discovery. It turned out that the flames seen by the taxi driver involved hot gases that burst into flame upon leaving the ventilating system opening on the roof of the 2-story building.

No flames were visible to first arriving firemen although it was evident that the fire was in the basement. After hose lines were charged firemen entered the first story but soon had to get out because of the heat and smoke. They reported that on touching merchandise on counters it crumbled in their hands. Efforts were made to ventilate the building from the roof, after which another attempt was made to enter the first story but as soon as fresh air entered the structure, flames enveloped the entire interior of the unsprinklered 7,500 sq. ft. brick, wood-joisted building.

At 4:45 A.M. the sprinkler alarm in an adjoining 3-story department store rang. Firemen investigated and found that heat had permeated the 12-in.-thick party wall and ignited merchandise stored in the third story. Three sprinklers had extinguished the fire.

Sept. 24, Winchester, Va. J. C. Penney Co. $425,000

At 7:40 P.M., twenty minutes before the store was to close for the weekend, customers and employees saw smoke coming from beneath doors and from ventilation grills of the basement stock room. On investigating and finding fire spreading beneath the ceiling of the stock room (stock room employees had gone home at 6:00 P.M.) an employee immediately warned customers and other employees to leave and told another employee to telephone the fire department.

Flames entered the basement sales area and spread so rapidly over combustible contents and up open stairways that some of the occupants just managed to get to the street doors before flames enveloped the first story. Operation of several exhaust fans was cited as a principal reason for the rapid spread of fire. When firemen arrived five minutes after the fire was discovered, flames had spread to most of the undivided and unsprinklered 9,300 sq. ft. 1-story brick, wood-joisted building.

Nov. 25, Franklin, Ind. G. C. Murphy Co. $500,000

Department store, offices. An explosion in the furnace that blew off the smoke pipe connecting the stoker-fed furnace to the chimney was heard by neighbors at 1:40 A.M. Because the furnace was not installed in a cut-off fire-resistive furnace room the fire spread to a heavy stock of Christmas goods and presented the small local fire department with a smoky basement fire beyond their capacity to control. Flames spread up open stairways to the first story and within walls to the second story and roof.

During the first 40 minutes while the local department fought the fire alone there was fear that the entire business district would be lost. A favorable wind, an unpierced fire wall on one side of the burning building, and an alley on the other, and the help that eventually arrived from seven communities confined fire damage to the building of origin.

Dec. 19, Montreal, Que. Maison Corbeil, et al. $650,000†

At 12:58 P.M., when an estimated 100 shoppers and 125 store personnel were in the store, fire broke out in the basement of the unsprinklered 15,600 sq. ft. 2-story brick, wood-joisted building. Smoke and fire rapidly spread through the building and occupants barely had time to get out through first story exits.

Customers, store personnel and smoke pouring into the street simultaneously were the first indication of the fire to people outside. Before the first piece of apparatus arrived flames were bursting from first story doorways. A 19-year-old girl who occupied a second story apartment jumped to the street accounting for the only injury. Other second story occupants were rescued over ladders.

Dec. 23, Elkhart, Ind. Charles S. Drake Co. $615,000†

With the only private fire protection consisting of some fire extinguishers and a combination furnaceman-watchman who made irregular unsupervised tours, fire originating in the basement spread undetected to the second story of the 10,168 sq. ft. 3-story brick, wood-joisted building before discovery by a truck driver at 5:35 A.M. The fire is a good example of the results that may be expected when means of limiting fire spread are not built into the building. In this instance open stairs and elevator shafts and nonfirestopped spaces in walls and above suspended metal ceilings contributed greatly to the extent of fire.

W. G. Chandler

Smoky basement fires are difficult to control if there is no sprinkler protection. This one in a Franklin, Ind. department store eventually spread through open stairways and within walls to the roof.

Five Cent to a Dollar Stores

***Jan. 1, Northampton, Mass. F. W. Woolworth Co., et al. $750,000**

Five and ten cent store, offices; printing plant. Summoned by a passerby at 2:00 A.M. firemen found fire burning on a display counter in the first story of this unsprinklered 3-story brick, wood-joisted building. The fire on the counter was extinguished after which firemen heard fire burning in the concealed space above the suspended metal ceiling. (Investigators concluded that the fire originated in the concealed space, the counter fire having been ignited by falling sparks.) Efforts were made to get at the fire by pulling down the ceiling, but it was too late as fire had extended to nonfirestopped walls and was spreading to upper stories.

Blank fire walls prevented spread to exposures on either side. A printing plant occupying a building in the rear was severely damaged when fire spread through a connecting wooden passageway.

Nov. 28, Flat River, Mo. Scott Store, et al. $366,000

Two five cent to a dollar stores. Fifteen minutes after the manager of one of the two stores occupying this building locked up and went home he was advised by telephone that his store was on fire. Firemen arriving at the same time could not enter to get at the fire which apparently was confined to the basement, because of smoke. Eventually flames enveloped the first story of the store of origin and on entering the undivided attic of this unsprinklered 1-story brick, wood-joisted building spread via the attic to the other store.

Food Stores**

March 13, East Farmingdale, N. Y. Unkle Zeke's Farmers Market $268,500

At 3:15 A.M. a neighbor of this huge wooden market building was awakened by the reflection of flames and on looking from his window saw that the market building was completely in flames. Assuming the fire department must be on the scene he went back to bed. Three quarters of an hour later the fire department received the first alarm. Fire fighting consisted of throwing up a water curtain to protect aircraft parked on an adjacent air field.

**See also Supermarkets.

March 19, Bluefield, W. Va. Baldwin's Market, et al. $252,000

Food; auto accessories, clothing stores; apartments. Thirty minutes after the first story food store had closed for the night occupants of the second story apartments smelled smoke from fire that originated in the food store's stockroom where 800 pounds of oleomargarine and 400 pounds of lard in cartons were stored. Fire had gained so much headway when discovered at 10:14 P.M. that second floor occupants were unable to save any of their belongings.

Flames spread by way of a light shaft to the attic and via the undivided attic to the rest of the unsprinklered 2-story brick, wood-joisted building.

June 12, Massapequa, N. Y. Massapequa Family Market $250,000

Stalls rented by about 100 merchants to sell food, clothing and household equipment. This 60,000 sq. ft. 2-story wooden building was destroyed by a suspicious fire discovered at 2:00 P.M. on a Sunday afternoon when the building was locked up. In the absence of automatic protection and a watchman, the fire had spread beyond control in the undivided structure before discovery.

Nov. 11, Trevose, Pa. Butch's Bucks County Market & Auction $488,000

Sixty-nine stalls — groceries, clothing, appliances, furniture, etc. Fire that destroyed most of this 47,200 sq. ft. 1-story masonry steel-framed building was caused by an overheated compressor motor in a dairy products stall. Stock in an adjoining shoe stall had ignited and fire had gained considerable headway before discovery by the watchman at 2:52 A.M. Among the factors contributing to the rapid spread of fire were absence of sprinklers, nonflameproofed canvas curtains that covered the stalls when not in use, rupture of a 3-inch gas pipe suspended from roof trusses, and unprotected openings in walls of adjoining buildings that made up this market.

Furniture Stores

Jan. 4, San Diego, Calif. Burnett Furniture Co., Inc. $390,000

Furniture store and warehouse. Originating in the rug cutting area on the first floor of the unsprinklered 6,300 sq. ft. 3-story brick, wood-joisted warehouse section, fire destroyed the 3-story section of origin and heavily dam-

Wide World

This furniture store fire at San Diego, Calif. originated on the first floor of the unsprinklered 3-story storage section at right, spread up an open elevator shaft and entered the second story of the sales section at left because a carpet over a fire door threshold prevented doors from being closed.

Twelve stores and 44 apartments were destroyed by fire that originated in a furniture store at Shenandoah, Pa., Feb. 4. As illustrated by this photo, the principal reason for the extensive damage was the lack of masonry fire walls between the combustible buildings.

aged the 24,200 sq. ft. second story of the adjoining 2-story store.

Employees at lunch in the first story of the warehouse smelled smoke at 12:45 P.M. One of them telephoned the alarm and others stretched 75 ft. of 1½-in. standpipe hose but had to drop it and run before water was turned on as fire spread through the congested furniture that was stored to the ceiling in every available space. Insufficient openings in exterior walls and furniture stored in front of what windows there were, prevented firemen from making effective use of hose streams in the storage section. Fire spread up an open elevator shaft to upper stories of the warehouse and to the second story of the adjoining sales area through a second-story fire wall opening protected by two fire doors. A carpet that had been laid over the threshold prevented firemen from closing these doors.

***Feb. 4, Shenandoah, Pa. Keystone Home Furnishings Shop, et al. $759,000**

12 stores, 44 apartments. All but two buildings in a one block area were destroyed by fire that was beyond control in a 3-story mercantile and apartment building when discovered by a truck driver at 2:45 A.M. High winds, below zero temperatures and poor water supplies greatly handicapped fire fighters, but the principal reason for the extent of damage was the absence of masonry walls to break up the congested combustible construction. The brick wall of a brewery was an important factor in the final control of the fire.

Investigation showed that the fire originated where an 8 in. by 8 in. wooden sill rested against a brick chimney. The flue lining at that location was cracked.

Feb. 21, Milwaukee, Wis. Meyer Stores, et al. $273,500†

Furniture and appliance store; plumbing supplies. Ignition of dried out and charred wooden joists by a high pressure steam header pipe that had been installed in the basement without proper clearance was the cause of fire that destroyed this unsprinklered 13,600 sq. ft. 2-story brick, wood-joisted building. The fire originated during the weekend and since there was no watchman and since the building janitor who was supposed to check the building was ill, the fire smoldered undetected until an employee opened the building at 7:50 A.M. on Monday (photo p. 332).

Firemen traced the odor of smoke to the basement but by then fire gases had followed electrical ducts to the concealed space above the first story ceiling. As fire fighters were attacking the fire in the basement the concealed ceiling space in the first story burst into flame and within minutes the ceiling collapsed. Fire then spread rapidly through the undivided first story and up open stairways to the second.

March 14, Boston, Mass. Gerry's, Inc. $300,000

The top story and roof of the unsprinklered 4-story brick, wood-joisted building were destroyed by fire that originated in joist channels between the roof and ceiling. Summoned by an employee at 4:19 P.M. firemen found the top story, used for stock storage, in flames and because of danger of roof collapse were forced to fight the fire from the street and from neighboring roofs. They succeeded in keeping fire damage to the top story although water damage on all floors was heavy and collapse of the roof caused a small area of each floor to collapse (photo p. 332).

Because men working on a sign on the roof had connected an extension cord for their power tool to a fourth story ceiling fixture, fire officials suggest overloaded wiring as a cause.

***March 15, Beaumont, Texas. Finger Furniture Co., et al. $431,000†**

Furniture store; music store. Three years after a $340,000 fire destroyed the 3-story

History repeated at this Beaumont, Texas furniture store.

United Press

With no watchman or automatic fire protection for this Milwaukee furniture and appliance store, fire smoldered undetected over the weekend until an employee opened the building at 7:50 Monday morning.

United Press

The Boston furniture store fire was burning between the roof and top story ceiling when discovered by an employee. Fire damage was confined to the top story, although water damage on all floors was heavy.

brick, wood-joisted building occupied by this furniture store, another fire wiped out the same store relocated in a 5-story building. Both fires broke out during the night in the upper stories of buildings that were unsprinklered and had no automatic fire detection equipment or watchman service. Both fires spread to other stories through open elevator shafts and both fires had assumed major proportions before discovery by cruising police.

Pianos and other contents of an adjoining 1-story building housing a music store were crushed when part of the wall of the furniture store collapsed.

March 28, Decatur, Ala. Sterchi Bros. Furniture Co. $250,000

When his attempt to start a wood fire in the basement stove did not succeed, the janitor poured kerosene on the kindling. Live coals from the previous fire in the stove ignited the kerosene explosively and set the clothing of the janitor afire. As he ran through the basement he tripped over and broke a glass gallon jug of gasoline and his burning clothing ignited paper-wrapped furniture. A salesman on the first floor telephoned the alarm promptly, but in the few minutes required for fire department response the fast spreading fire had involved all of the basement and had extended up the open stairs and elevator shafts to the first story of the unsprinklered 2-story brick, wood-joisted building.

***June 27, El Reno, Okla. Brinkley Furniture Co., et al. $270,000**

Furniture, household appliances, dry goods, lodge rooms. Two adjoining 3-story brick, wood-joisted buildings were destroyed by fire that originated in the undivided and unsprinklered 14,750 sq. ft. basement of one of them. Summoned by an outsider at 6:30 P.M., firemen were unable to get into the smoke-filled basement, and soon thereafter fire flashed up open stair and elevator shafts to upper stories of the unsprinklered building.

Flames broke through the roof and spread over the top of a nonparapeted fire wall to an adjoining 3-story building. Help from other communities was called but before a strong fire fighting force could be assembled fire had extended down through open stair and elevator shafts in the unsprinklered exposure.

Oct. 10, Sharon, Pa. J. M. Willson & Sons $445,000

A fire which in all probability would have caused insignificant damage had the building

United Press

Even though clerks and customers were in this Sharon, Pa. furniture store, it was possible for fire that eventually reached large loss proportions to develop undetected in an unsprinklered partitioned-off storage area in the third story.

been sprinklered, accounted for a $445,000 loss because such protection was missing. At 10:30 A.M., two hours before Monday store opening time, fire was discovered almost simultaneously by a passerby and by an employee in the third story of this 3-story brick, wood-joisted building.

The fire originated in a 30 ft. by 20 ft. floor-covering storage area (it was also used as a base of operations by painters) partitioned off from the rest of the third story by wood and glass partitions. When discovered the fire had already broken windows in outside walls, an indication that it had burned for some time before detection.

Employees went for a standpipe hose but were driven out before using it. Flames soon started to spread throughout the third story but did not make much progress because of prompt action by firemen who chopped holes in the roof and inserted cellar nozzles. In this way the fire was soon brought under control. Water damage to lower floors was heavy, accounting for 75 per cent of the loss.

Nov. 13, Hempstead, N. Y. George's Fine Furniture Store $284,000

At 1:20 P.M., Sunday, a passerby saw rubbish burning in the rear of this 6,000 sq. ft. 2-story brick, wood-joisted building and gave the alarm. Expecting to be confronted with a rubbish fire, firemen discovered the entire basement involved and fire spreading up a large open stairway to the first story and within nonfirestopped walls and partitions to the second story. Needless to say, the building lacked automatic or watchman protection.

Investigators concluded that the fire did not originate in the rubbish in the yard, but that it started in the furniture refinishing room in the basement and had extended through basement windows to the rubbish before discovery.

United Press

A refinishing room in the basement was the point of origin of this fire in a furniture store at Hempstead, N. Y.

Gasoline Station

***Sept. 9, Lancaster, Ky. Ray's Service Station, et al. $600,000**

Gasoline station; 20 other buildings; two stockyards. During gravity transfer of gasoline from a tank truck to a 2,000-gallon underground storage tank, fire broke out that eventually destroyed the service station, about twenty other buildings and two stockyards. Substandard installation of the fill and vent pipes on the storage tanks was responsible for the fire's start. Weak public fire protection was responsible for the extensive damage.

Features of the fill and vent pipes that did not meet minimum safety recommendations in the NFPA Flammable Liquids Ordinance included location of the fill pipe very close to the door opening to the service station, construction of the vent pipe of 1-in. inside diameter pipe, extension of the vertical vent pipe only 6½ ft. above the ground, and termination of the vent pipe with a U-bend.

As gasoline flowed from the front compartment of the tank truck into the storage tank, vapors escaped from the vent pipe and from the fill pipe opening (the 1-in. nozzle was much smaller than the fill pipe) and flowed through the adjacent doorway of the service station. Five minutes after the transfer started, a mild explosion blew out the windows of the service station and knocked down the two men present. A 4-ft.-high fire burned at the fill pipe opening and small fires broke out on window frames. The flame at the fill pipe died down as soon as the truck driver shut the emergency valves on the truck, and had an extinguisher been discharged at the time, the remaining fire in all probability could have been put out. No one thought to use the extinguishers in the station and truck, and the foam extinguisher that was brought over from a garage across the street had not been properly maintained and could not be operated.

Prior to driving the truck to safety (apparently at the insistence of bystanders who feared it would explode), the driver disconnected the fill hose at the truck allowing about eight gallons of gasoline to spill under the truck. The spill ignited and flame spread to the tires and paint on the truck and within a few minutes vapors at the truck vent at the dome of the front compartment ignited. Prior to unloading the front compartment the dome covers on the rear compartments had been partly opened to facilitate vacuum relief during unloading. The contents of the two rear compartments also ignited, blowing the dome covers completely open, and sending a column of smoke and flames into the air.

Fire department response was delayed because the fire siren was mistaken for the noontime test blow, and when firemen finally arrived and managed to get two weak hose streams in operation, the fire had involved the service station, causing numerous explosions of drums and cans of oil, and had spread to adjacent stockyards, had jumped clear spaces and had involved several buildings in the neighborhood.

Firemen from surrounding towns who eventually reached the scene were severely hampered by weak water supplies, but were able to save several threatened exposures.

Lexington Herald Leader

Substandard installation of gasoline storage tank fill and vent pipes at a service station was responsible for the start of a $600,000 fire at Lancaster, Ky.

United Press

Fire spread to seven buildings in Lynchburg, Va. because floor and ceiling joists of adjoining buildings abutted in party walls and in some instances extended through the walls. Doorways had been cut in some of the walls.

N. Y. Daily News

In contrast with the Lynchburg, Va. fire pictured at the top of this page, this fire at Newark, N. J., Jan. 28, was confined to the building of origin. Joist sockets were staggered and in all other respects the party walls were standard.

Hardware Store

***Dec. 21, Lynchburg, Va. Bailey Spencer Hardware Co., et al. $2,500,000**

Eight buildings housing two hardware stores, two department stores, clothing store, florist, electrical appliance shop, drug store. Six 2- and 3-story brick, wood-joisted buildings were destroyed and two were damaged by fire that originated in the basement of a hardware store and which was probably due to faulty operation of an oil-fired furnace. The furnace had not been operating properly, and on the day before the fire a heating contractor had found the burners clogged and had recommended a thorough cleaning.

Feeding on paints and other containers of flammable liquids stored near the furnace, the fire spread to adjacent open stair and elevator shafts and had made great headway in the unsprinklered and undivided 3-story building before discovery by a taxi driver at 3:52 A.M.

Party walls separated the building of origin from buildings on either side, but in all instances floor and ceiling joists either extended through the walls or abutted joists from the adjoining building and in some cases unprotected doorways had been cut in the walls.

Fire spread through joist sockets and in some instances through doorways, to other buildings in the row. Spread in one direction was checked by an unpierced parapeted fire wall and in the other direction by a sprinklered building (the only sprinklered building involved) where eight sprinklers operating in the top story and firemen using a small hose stream extinguished fire coming through joist sockets.

Jewelry Stores

Jan. 28, Newark, N. J. Abelsons Jewelers, et al. $327,500

Jewelry, clothing stores. Fire that appeared to have originated in floor construction directly above an oil burner in the basement, destroyed this 200 ft. by 50 ft. 4-story brick, wood-joisted building. Unpierced fire walls prevented spread to adjoining buildings but occupants of exposures suffered smoke and water damage.

When discovered by a passerby at 7:26 A.M. the fire had control of the basement. Had the basement been sprinklered and had there been access to the basement for fire fighting the fire could probably have been prevented from spreading to upper floors.

***March 2, Manchester, N. H. Roberts Jewelry, et al. $386,500**

Three buildings with small retail stores on first floor, offices above. Three adjoining and communicating 3-story brick, wood-joisted buildings were badly damaged by fire that originated in the repair department of a jewelry store on the first floor of the middle building. Overloaded, improperly installed electric wiring strung by a jewelry store employee was the probable cause of the fire that was spreading up through the undivided building when firemen answered a passerby's alarm at 5:52 P.M. Absence of automatic fire protection, and the fact that the fire occurred on a Wednesday afternoon when all stores were closed prevented earlier discovery.

Destruction was almost total in the building of origin. Unprotected doorways knocked in division walls allowed fire to spread to unsprinklered exposures on either side, one of which suffered 70 per cent and the other 10 per cent destruction before the fire could be checked by fire department hose streams.

Oct. 10, Allentown, Pa. Thornton Jewelry Co., et al. $340,000; 1 killed

Jewelry store, record shop, billiard parlor, shirt factory. Police in a cruiser discovered

Allentown, Pa., fire emphasized the fact that a sleeping janitor is not a watchman.

Wide World

Four stores were damaged in this New York City fire because the basement beneath them was not subdivided by masonry walls.

fire at 4:38 A.M. that destroyed this 4-story brick, wood-joisted building and took the life of a 44-year-old man asleep in the second story billiard parlor. A janitor who slept in the building escaped.

The fire originated in the middle of the first story jewelry store where, because of the absence of automatic protection, it burned for several hours before discovery. Hampered by dense smoke, and inaccessibility of the interior of the building due to its 231-ft.-depth and many partitions, firemen were unable to prevent the fire from reaching upper stories.

Multiple Occupancy Stores

Jan. 12, New York (Brooklyn), N. Y. Goldfarb's Gift Shop, $500,000; 1 killed

Gift shop, haberdashery, corset shop, clothing stores. After the gift shop had closed, but while three employees were still on the premises, fire broke out in the basement. It spread rapidly through the undivided basement where flammable furniture refinishing materials and packing materials were stored and extended to the first and second stories through pipe recesses and nonfirestopped partitions. A fire fighter was asphyxiated.

Feb. 10, Saugus, Mass. Cliftondale Lodge of Odd Fellows, et al. $675,000

Food store, lodge hall, club, bank, four offices. Delay in fire department notification until after occupants had tried unsuccessfully to extinguish a basement fire appeared to be an important factor in the destruction of this unsprinklered 3-story brick, wood-joisted building. When fire fighters answered an occupant's alarm at 5:00 P.M. fire was raging in the basement and soon spread through stairways and other unprotected openings to the upper stories. Insufficient hydrants (the nearest was 500 ft. away) and small water mains were notable public fire protection weaknesses.

Feb. 12, McKeesport, Pa. F. O. Reed Building $250,000

Two shoe stores, two clothing stores, one jewelry shop. At 8:30 P.M., when occupants locked up and went home, smoke odor was noticed but no one bothered to do anything about it. Had they notified the fire department at that time, fire in the third story (used principally for storage of window and store display material) could undoubtedly have been extinguished with minor damage. As it was the fire was not discovered until 45 minutes later when an outsider saw flames coming from a third story window of the unsprinklered 3-story brick, wood-joisted building. Fire by then was beyond control and burned off the roof before being extinguished.

***March 11, Union City, Ind. Rye Building, et al. $388,500**

Auto accessory, music, hardware, clothing, shoe stores; mop factory; lodge hall; apartments. Substandard exposure protection was a glaring fire protection weakness at this fire that destroyed three buildings, severely damaged a fourth and caused minor damage to

several others in the business district. But for a favorable wind the fire would probably have developed into a conflagration.

During a severe electrical storm firemen were notified at 3:10 A.M. by an outsider, of fire in the storeroom of a mop factory in the second story of the unsprinklered 3-story brick, wood-joisted building. Lightning was the probable cause. Firemen put the visible fire out with a small hose line, checked the building and returned to quarters. Apparently, however, undetected fire burned in a concealed ceiling or wall space, since on being recalled to the building at 4:00 A.M. firemen found the two upper floors of the building of origin and an adjoining unsprinklered 3-story brick, wood-joisted building heavily charged with smoke. The brick wall between these buildings was 12 in. thick and extended 12 in. above the roof. The several former door openings in the wall had been closed with hollow concrete blocks, or bricks not tied in. One or more of these substandard features allowed the fire to spread to the exposed building before firemen arrived. Fire broke into the open in upper stories of both buildings soon after fire fighters arrived. Twenty barrels of motor oil, three barrels of wax, and stored rubber tires were among the combustible contents contributing to the rapid spread of fire through these two buildings.

Fire spread to an unsprinklered 2-story brick, wood-joisted exposure when flames burst from the only window in the exposing wall of the building of origin and ignited the gable roof of the 2-story exposure. The building was destroyed and fire jumped to the roof of an adjoining 2-story building but was checked at the roof. Heat melted windows in buildings across an 80-ft.-wide street from the fire, but further damage to exposures was prevented by the coordinated attack of the local and mutual aid fire departments.

***March 17, Lowell, Mass. Central Block $561,000; 1 killed**

Department store, bank, 50 offices, apartment. Fire discovered at 11:59 P.M. by a girl on duty at a telephone answering service on the fifth floor destroyed the 10,000 sq. ft. 5-story brick, wood-joisted building of origin and an adjoining 3-story annex. The owner of the telephone answering service, who slept on the fifth floor, was trapped and killed because she stopped to dress.

An old sprinkler system protected the basement and first story. Evidence indicated that the fire originated in an unsprinklered upper story (probably the fourth) and spread to other stories above the first through open stairways and plywood-enclosed elevator shafts. The fire chief believes that an open fire door in the fire wall permitted the fire to enter the third story of the exposure.

Several small roof fires in the neighborhood were extinguished before causing serious damage due to the excellent work of the fire department.

Lowell Sun

This March 17 fire at Lowell, Mass. started in an upper story. Only the basement and first story were sprinklered.

***April 9, Freeport, Ill. Second National Building, et al. $517,500†**

Three buildings housing 21 mercantile and office tenants. When fire was discovered at 5:15 A.M. by an occupant of a neighboring building, dense smoke was coming from top story windows of the unsprinklered 5-story brick, wood-joisted store and office building. Smoke prevented firemen from entering the first story lobby and before the roof could be ventilated an explosion of fire gases blew out windows, dropped the attic ceiling and raised the roof. The fire thereafter burned down through the building burning off floor joists and dropping floors as it progressed.

Although a party wall separated the building of origin from an adjoining unsprinklered 2- and 3-story brick, wood-joisted clothing store, fire entered the attic space of the clothing store, after bursting from a window of the building of origin 12 in. from the roof of the exposure. Fire may also have entered the roof space by means of a wooden elevator penthouse. The next building in line was a sprinklered 3-story department store with

manually operated open window sprinklers on windows above the roof of the 2-story section of the clothing store. Heat ignited the window frames, and since no one remembered to operate the window sprinklers, hose streams were used to keep fire from entering through these windows. The fire was kept outside and heat was not sufficient to operate inside sprinklers but the water damage from the hose streams on all floors was heavy.

Aug. 12, Hackensack, N. J. Rogers Clothing Store, et al. $250,000

Unused theatre, clothing, jewelry and candy stores. Carelessness by vagrants who slept in the basement dressing rooms of the former vaudeville house was the probable cause of fire that burned out this 192 ft. by 48 ft. 2-story brick, wood-joisted building. With no automatic or watchman protection provided the fire was beyond control in the basement and had spread to the undivided concealed space between the roof and auditorium ceiling before discovery by a pedestrian at 7:26 A.M.

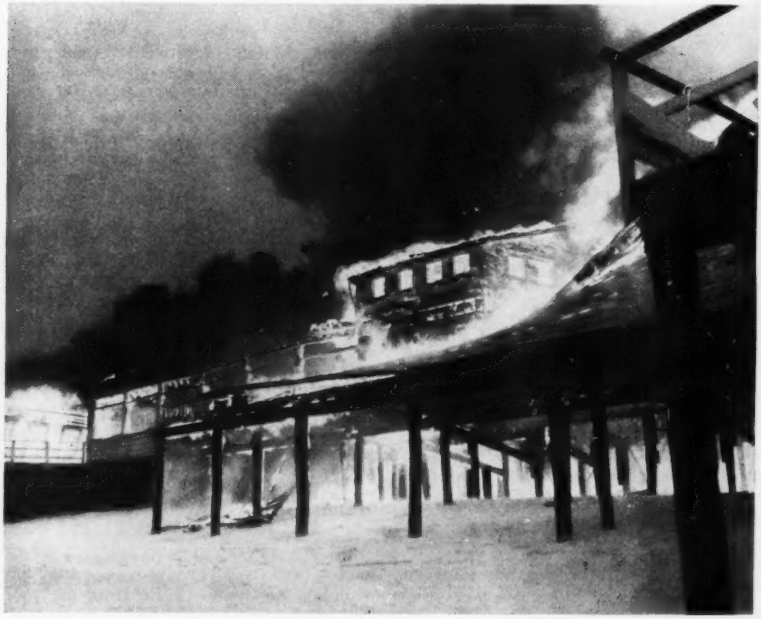
Restaurants

***Mar. 21, Nicolet, Que., A. Mathieu, et al. $750,000**

Thirty-five buildings including 15 stores. Fire that is believed to have started at a deep-fat frying machine in a restaurant spread rapidly through four blocks of congested wooden buildings before reaching the river's edge where it was brought under control by firemen from five towns.

***June 9, Seaside Heights, N. J. Pier Restaurant, et al. $1,250,000**

Boardwalk and 56 concessions. At 6:45 A.M. a policeman discovered fire that apparently originated at a restaurant building on the water side of the boardwalk. The fire was spreading rapidly when discovered and because of high winds and congested combustible construction, destroyed a 550-ft. stretch of boardwalk including 56 concessions on both sides before being controlled by



A 550-ft. stretch of boardwalk plus 56 concessions in combustible buildings on both sides were destroyed by fire at Seaside Heights, N. J., June 9. The fire was beyond control in a restaurant when discovered.

the combined efforts of 14 fire departments. Several hours' rain preceding and during the fire prevented more widespread damage.

***Nov. 25, Newport, R. I. Chin's Restaurant, et al. $300,000**

Restaurant, drug store, shoe store, apartments. Two adjoining 3-story brick, wood-joisted buildings were practically destroyed by fire that originated in barrels of rubbish in a rear alley. At about the time the fire was discovered by occupants of apartments on upper floors (4:53 P.M.), flames entered plain glass windows in the rear of both buildings.

Avon Studio

Originating in rubbish barrels in the rear alley, fire entered two Newport, R. I. stores through plain glass windows.

Shoe Stores

***Oct. 25, Findlay, Ohio. Turner-Fenstermaker Shoe Co., et al. $580,500**

Shoe store; two wearing apparel shops, lodge room, eight apartments. An overheated gas-fired ceiling furnace above the suspended ceiling in the second story was the reported cause of fire that destroyed the 3,000 sq. ft. 3-story brick, wood-joisted building of origin and burned out the top stories of the two adjoining 3-story buildings. The furnace was suspended in a 4-ft.-high concealed space formed by the original first story metal ceiling and a wood lath and plaster ceiling that was added later. The furnace was surrounded by asbestos board nailed to wood studding.

An overheated gas-fired ceiling furnace suspended in a 4-ft-high ceiling space reportedly caused this Findlay, Ohio fire.

Due to the absence of automatic or watchman protection the fire burned undetected until an occupant of an apartment in an adjoining building smelled smoke at 7:14 A.M. By then the fire had spread laterally above the suspended ceiling in the second story and had spread up an open elevator shaft to the third story and attic. Fire fighters were greatly handicapped by the inaccessibility of the fire in concealed ceiling and wall spaces.

The buildings on either side of the building of origin were six feet higher. Lack of parapets on masonry party walls allowed the fire to ignite the roofs and enter the attics of the exposures after it broke through the roof of the building of origin.

Supermarkets

Feb. 7, Phoenix, Ariz. Farm Fresh Market, et al. $270,000

Supermarket, post office, jeweler. This 20,000 sq. ft. concrete block, wood-joisted building was destroyed by fire that originated in the vicinity of the office on the mezzanine in the rear. The store manager was telephoning when the line went dead and smoke became noticeable. He immediately used the store's public address system to order customers and employees from the building.

Lack of sprinklers and fire walls allowed the fire to spread rapidly beneath the combustible roof (there was no ceiling) and flames and smoke were coming from ventilation openings, windows, and cracks in the masonry when the first engine company arrived. Attempts were made to ventilate the building and one engine company took a hose inside in an effort to get at the fire which was concentrated at roof level. These men were forced out by the smoke minutes before the roof gave way (wood framing and a covering that appeared to be tar-paper-covered slabs of excelsior) and portions of walls fell in.

March 3, Fairborn, Ohio Eavey Company $310,000†

This 14,000 sq. ft. supermarket was constructed of glazed tile walls, steel trusses, and sheet metal roof deck. Because of these structural features the store manager was under the illusion that a serious fire could not occur. What he did not take into consideration was a combustible fibreboard ceiling 30 in. below the roof deck, combustible fibreboard and plywood partitions, combustibility of the contents, absence of a division wall between service and sales areas and absence of sprinklers.

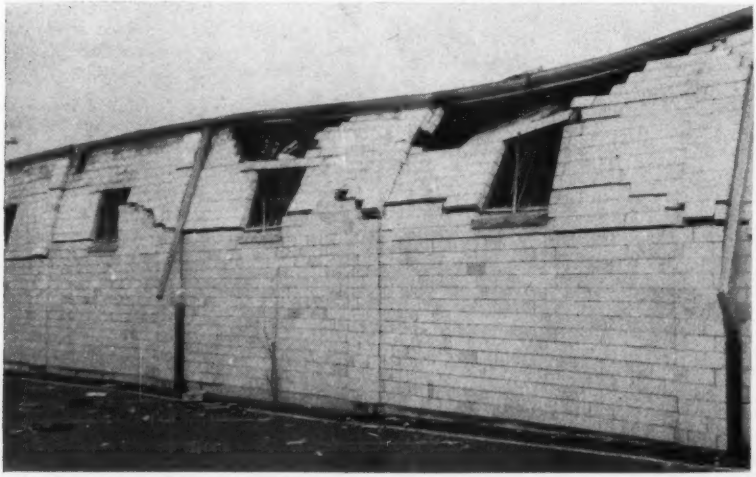
The fire originated in the service area in the rear either at a refrigeration motor near the combustible ceiling or in a combustible rubbish bin just below the motor. It apparently had been burning for some time before discovery at 11:30 P.M. by a neighbor who saw the reflection of fire in a small window at ceiling level in the rear wall of the store.

Fire fighters experienced considerable difficulty in opening the two rear doors which were padlocked and barred by 2 in. by 6 in. planks on the inside. Attempt at entry was then made through the front door, but as the door was being opened an explosion blew out a large front window and flames enveloped the interior including the combustible ceiling, partitions and combustible contents.

May 19, Shawnee Twp., Kans. Justrite Supermarket, Inc. $380,000

Fire that severely damaged this unsprinklered 12,600 sq. ft. noncombustible 1-story building has been attributed to faulty operation of a gas-fired incinerator in the basement. The incinerator had undergone repairs on the day of the fire. The fire occurred when a boy in the first story stock room removed the cover from the charging chute to deposit some cartons. Flames burst from the opening and ignited cartons piled nearby.

The stockroom boy and a clerk tried without success to extinguish the fire with carbon



Noncombustible construction does not assure protection from disastrous fires—as was demonstrated by this supermarket fire at Fairborn, Ohio, March 31. Inside were a combustible fibreboard ceiling, plywood and combustible fibreboard partitions.

St. Louis Post Dispatch

At Pine Lawn, Mo., Oct. 15, fire originated in rubbish on a rear loading platform of a supermarket, broke a window and entered the undivided concealed space formed by the roof and combustible fibreboard ceiling.

dioxide extinguishers, and when the store manager came back to investigate, fire was spreading through the stock room and had entered the air conditioning unit that supplies air to the sales section through metal ducts in the 1-ft.-high concealed space between the aluminum ceiling and the metal roof deck. As the manager walked back toward the front of the store advising customers and clerks to leave, smoke was discharging into the sales area from ventilating system openings.

Fire soon broke out in the sales area. Heat was so intense when firemen arrived (a fire station was across the street from the store) that the building could not be entered, and a few minutes later the combustible roof covering ignited (1-inch combustible insulation with built-up surfacing). Blank walls on three sides of the building, stock piled at rear entrance and lack of aerial ladders were several fire fighting handicaps during the early stages of the fire. After the roof and ceiling collapsed hose streams could be used more effectively.

Oct. 15, Pine Lawn, Mo. The Great Atlantic & Pacific Tea Co. $250,000

Originating in rubbish that had been allowed to accumulate on the rear loading platform, fire broke a rear window and entered the concealed space formed by the building roof and suspended combustible fibreboard ceiling above the service area. Since no automatic protection was provided and no fire wall had been erected between the service and sales areas, the fire spread through the undivided roof space that extended over the entire store.

When firemen were summoned by a pedestrian at 3:30 A.M. it was too late to save the building.

Nov. 7, Hazel Park, Mich. Food Fair Market $305,000

At 7:45 P.M., while the store was open, fire broke out in the rear storage and incinerator room. Cause of the fire was not determined although fire department investigators suggest that the contents of one of the stored cans of antifreeze may have leaked from a damaged can and been ignited by the incinerator or the pilot light on a gas hot water heater.

All escaped safely as the fire spread into the sales area through an unprotected opening in a partition and also entered the undivided concealed space above the ceiling of the unsprinklered 8,000 sq. ft. 1-story masonry, wood-joisted building.

Nov. 28, Livonia, Mich. Wrigley's Supermarket $425,000

An electrical fault in a 2-inch conduit was the probable cause of fire that started in a concealed space formed by an exterior wall and plywood interior finish. Although employees were in the building when the fire started it was not discovered promptly because of the concealed point of origin. Fire spread up behind the plywood finish and when firemen arrived had entered and was spreading through the undivided and unsprinklered 21,700 sq. ft. concealed space between the ceiling and roof.

The Largest Warehouse Fires of 1955

There were 41 "large loss" warehouse fires in 1955 as compared with 54 in 1954. Thus, for the first time since 1950, when there were 23 large losses, the steady upward trend in the annual number of such warehouse fires has been reversed. Six were killed (including 3 firemen) and 136 were injured (102 firemen) in this handful of fires. Losses totaled $19,149,000.

The decrease in the number of disastrous warehouse fires can be the beginning of a steady downward trend if the lessons of 1955 are applied.

Four Sprinklered Warehouses

No sprinkler protection was provided in 36 of the 40 warehouses. Sprinklers performed satisfactorily in one of the four having such protection although operation was seriously delayed by high piling of stock and other factors, (baled rag warehouse, Baltimore, Md., July 19). The three other disastrous losses in sprinklered warehouses illustrated the need of central-station-supervision of sprinklers. In the electrical appliance fire at York Twp., Ont., Feb. 12, lack of sprinkler supervision allowed an arsonist to shut off the system before setting fire to the building. Sprinklers in a furniture warehouse at Allentown, Pa., May 21 were overpowered by an exposure fire that ignited eaves and also entered through plain glass windows. Here again this serious loss could probably have been averted had the system been supervised, since sprinklers operated an estimated 15 minutes before someone called the fire department. By then the fire was beyond control in the roof above sprinklers. In a general storage warehouse at Chicago, July 7, sprinkler discharge could not extinguish a smoldering fire in high-piled upholstered furniture. Since the system was not supervised smoke and heat continued to be generated by the concealed fire and eventually a series of fire gas explosions spread the fire through the building.

Delayed Detection

With prompt detection a key to small losses, it is significant that detection was delayed in 32 of the 41 fires. In 20, discovery was delayed because no watchman or automatic protection was provided, in ten the watchman protection was substandard (no regular supervised rounds, toured outside the building only, etc.). Two warehouses were protected by a central-station-supervised detection system. In one (hardware warehouse, Calgary, Alberta), this protection had not been extended to a recently constructed mezzanine where the fire originated, delaying operation of the system until the fire was beyond ready control. In the other (department store warehouse, Lansing, Michigan) there was not apparently a serious delay in detection by the central station system yet when the first engine company arrived the entire rear section appeared to be involved.

The advantage gained by prompt discovery was lost in six fires because occupants chose to fight the fire with first aid equipment and did not give the alarm until the fire was beyond control.

Excessive Fire Areas

Concentration of materials of value is an inherent feature of warehouses. The 1955 record of large loss fires contains more evidence that subdivision of these concentrations of values in separate fire areas is an essential prerequisite of large loss prevention. In the 40 buildings in which large loss storage fires occurred (the 41st fire involved yard storage) 26 had no division walls, five had division walls but doorways in the walls were unprotected, and in one case a fire door was blocked open, allowing the fire to spread

to the adjoining fire area. Among the 22 fires in multi-storied warehouses there were 33 instances of fire extending up or down open stairways and elevator shafts to other floors.

At least one of the large loss fires might have been averted had an extinguisher of the proper type and size been available (canned food, Lodi, Calif., April 15). Had standpipes and hose been available the losses from seven of the fires probably would have been relatively insignificant.

Building Materials Warehouse

May 16, Stillwater, Minn. Anderson Corp., et al. $387,500

Thirty-eight carloads of wooden window frames; 18 used and 14 new cars. Lack of automatic protection and division walls were the principal factors responsible for destruction of this undivided 500 ft. by 250 ft. steel-framed, woodclad building. A machine shop formerly operated in the building, but at the time of the fire the machinery was idle and parts of the building were used for storage of window frames and new and used cars.

The owner of the window frames provided a watchman but for some unexplained reason the fire was first discovered by a neighbor at 3:32 P.M. At that time the building was heavily involved. Inadequate water from hydrants near the end of a dead-end 6-inch main hampered firemen but they did manage to prevent spread to exposures.

Investigation by the State Fire Marshal's office indicated that the fire started in a bank of three transformers on poles 50 ft. from the building and from there was driven by high winds along wires to the building.

July 12, Los Angeles, Calif. Mason Supplies, Inc. $250,000

Fire that destroyed this 20,000 sq. ft. wood-framed, metalclad building originated in scrap paper piled against the inside of one of the metal exterior walls. It is believed that sparks from trash being burned in an open metal barrel on a loading platform on the other side of the wall went through cracks in the metal wall and ignited the scrap paper. Employees discovered the fire soon after it broke out but due to the absence of sprinkler protection it spread rapidly through the undivided combustible interior.

Dec. 7, near Childersburg, Ala. Alabama Ordnance Works $400,000

Paint, wallboard, plywood, lumber, roofing and other supplies to be used in construction of a large powder plant; machine and welding shops. Substandard watchman protection which did not require an Army Reservation watchman to enter this building was a major factor in the destruction of this unsprinklered and undivided 80 ft. by 280 ft. combustible building. At 5:50 A.M. an outsider saw the interior of the building burst into flames — five minutes after the watchman punched his clock on the outside of the building and observed nothing out of order on looking in the windows. Reports of a muffled explosion when the fire was first seen suggest that the fire may have smoldered, generating gases which eventually ignited explosively.

Cotton Storage

Nov. 22, Sudan, Texas Central Compress & Warehouse Co. $260,000

2143 bales of yard-stored cotton. A fire-packed bale was believed responsible for fire that damaged or destroyed 2,143 bales of freshly ginned cotton that comprised part of 3,034 bales stored one on end in a 200 ft. by 600 ft. yard. Fifty-ft.-wide fire breaks separated the bales into 1000-bale blocks.

The fire started while 40 to 50 mph winds were blowing and was discovered when employees working in another yard heard bands breaking on the fire-packed bale. Immediately burning cotton was carried to other bales downwind, and by the time the private fire brigade and the public fire department had hose streams in action, practically all bales except the 891 upwind from the point of origin were burning and bale bands were breaking.

Although a watch tower was provided from which this and other cotton storage yards could be supervised, no watchman was on duty on the day of the fire despite the high winds. Had a watchman been provided the fire would probably have been detected in time to confine it to the bales of origin.

An asterisk (*) before a listing of a fire indicates fire spread to other buildings.

A dagger (†) after a loss figure indicates that the figure includes an insured business interruption loss.

Lansing Fire Department

The advantage gained by reasonably prompt detection of fire by a central-station-supervised rate-of-rise detection system was lost at this department store warehouse at Lansing, Mich., April 29 because high-piled combustible stock and absence of sprinkler protection permitted the fire to spread rapidly.

Department Store Warehouse

April 29, Lansing, Mich. F. N. Arbaugh Co. $400,500

Fire that destroyed this unsprinklered 20,240 sq. ft. 1-story masonry, steel-framed warehouse was detected by a rate-of-rise type central-station-supervised automatic detection system at 8:33 A.M., about 30 minutes after four employees had reported for work. Investigators were of the opinion that there had not been a long delay in detection although a short delay may have resulted because of high piled stock and construction of additional stock racks after the installation of the detection system.

A masonry wall with unprotected doorways divided the heavily loaded building into two sections. The fire originated in the rear section and was believed caused by a defective fluorescent light fixture in contact with high-piled stock. The entire rear section appeared to be involved when the first engine companies arrived. Efforts were made to check the spread at the unprotected openings in the division wall, but because of intense heat and smoke and danger from burning merchandise toppling from shelves, firemen were forced to abandon inside fire fighting.

Electrical Equipment Warehouse

Feb. 12, York Twp., Ont. Rotor Electric Co., et al. $271,000

Electrical appliances. Lack of sprinkler supervision and watchman protection made it possible for an arsonist to shut off the sprinkler system before setting fire to this 6,600 sq. ft. 2-story masonry, wood-joisted building. The fire was beyond control when discovered by a passing truck driver at 3:09 A.M.

April 30, Santa Monica, Calif. Packard-Bell Co., et al. $392,500

Electrical appliances; rooming house. This unsprinklered 1- and 2-story building with an undivided ground floor area of 15,000 sq. ft. was destroyed by fire that was first reported at 2:16 P.M. by an occupant of a tall building a block away. Flames were then coming from the roof of the 1-story section where 2,000 TV sets and 1,000 coolers were stored in crates. The occupants of the seven rooms and

one apartment on the second floor escaped before flames enveloped the structure.

Fertilizer Warehouse

Jan. 28, Pensacola, Fla. L and N Railroad Co. $750,000

Sodium nitrate storage and bagging; 20 box cars. Careless disposal of smoking materials by an employee was the probable cause of fire that destroyed this unsprinklered and undivided 40,000 sq. ft. brick, steel-framed warehouse containing 25,000 tons of sodium nitrate. The fire when discovered was small, and was in the paper bag storage area where bags were piled 12 feet high. Instead of calling the fire department at once, the employees attacked the fire with extinguishers and had almost succeeded in putting it out when the extinguishers were expended. They next ran for a standpipe hose 400 ft. away and started to drag it to the fire, only to discover that it was too short and its nozzle was missing. Additional hose farther away was then sent for, but before this could be obtained the fire was so large that it was decided to give the alarm. It is estimated that fire department notification was delayed 20 minutes.

When firemen arrived, the fire was traveling through the building, feeding on paper bags and nitrate-impregnated wooden partitions and bulkheads and it was soon apparent that all efforts should be directed toward saving warehouses connected to the fire building by long wooden platforms. The fire spread to 20 box cars of bagged nitrate and creosoted lumber but was kept from exposed buildings.

Food and Groceries Warehouses

***April 8, Poplar Bluff, Mo. Southeastern Missouri Grocery Co. $275,000**

Wholesale grocery warehouse. At 6:55 P.M., an hour after this 4,943 sq. ft. 3-story brick, wood-joisted building had been locked up for the night, a passerby noticed fire inside and telephoned the alarm. On arrival firemen found the front door open, fires burning at several places on the first and second floors and the roof already involved. It was then too late to prevent complete destruction of the heavily stocked warehouse. No automatic protection or watchman was provided.

When heat caused windows in an adjacent newspaper plant to break, pressmen were kept busy extinguishing fires started in the unsprinklered pressroom by embers that blew in the windows.

***May 5, Hammond, Ind. Great Lakes Warehouse Co., et al. $2,500,000**

Food products warehouse; general storage; chemical company yard storage and manufacturing; lumber mill; wallpaper factory. Following their usual practice employees burned trash in the yard despite the fact that a 45 mph wind was blowing toward several buildings. Wind-carried sparks landed beneath the wooden loading platform 100 ft. away on a 15,500 sq. ft. 3-story brick, wood-joisted warehouse. A brisk fire had developed beneath the platform before discovery by a truck driver at 10:30 A.M.

The extensive damage that followed could probably have been prevented had the fire department been called at once. Instead of giving the alarm employees fought the fire with a yard hydrant hose and when this attack failed, tried to telephone the fire department only to find that the telephone was out of order (a contractor's crew two blocks away had damaged the wires). The alarm was finally telephoned from another location 35 minutes after the fire was discovered. Even then there was not normal fire department response since the telephone message stated that a grass fire was in progress.

When fire fighters arrived they found that fire had entered the 3-story warehouse and was speeding rapidly up through the unsprinklered building. Fire also was spreading through grass and weeds to an unsprinklered 5,000 sq. ft. 1-story masonry, wood-joisted food products warehouse about 250 ft. from the original trash fire. Flames entered this building and also continued through the high grass to a large yard storage area occupied by a chemical company for storage of full and empty drums. Here the fire was intensified by exploding drums of flammable liquids and soon the group of chemical plant buildings (750 ft. from the original trash fire) was in flames.

Thus, almost from the time of their arrival, firemen were confronted with a fire involving several buildings and a large yard-storage area. Three other buildings were later ignited. Adjoining the 3-story warehouse (the first building involved) was an unsprinklered 6-story fire-resistive warehouse. When flames broke through the roof of the 3-story building they entered the upper two floors of the 6-story exposure through wired glass windows in the exposed wall. The upper two floors were burned out.

Wide World

This $2,500,000 fire at Hammond, Ind., May 5, was the outcome of trash burning by employees in the yard despite a 45 mph wind. Fire department notification was delayed 35 minutes as employees first fought the fire with a yard hydrant hose.

The unsprinklered food products warehouse exposed an adjoining warehouse, but in this case the two buildings were separated by a parapeted fire wall with openings protected by double fire doors.

Due to the high winds and exploding drums of solvents, embers set fire to a lumber mill and to a wallpaper factory, one block and ¼ mile from the chemical plant respectively. Both of these fires were extinguished before causing extensive damage.

***June 22, Toronto, Ont. Toronto Elevators Ltd. $643,000**

Cereal, seeds, dog food and fertilizer bags. Fire believed caused by spontaneous heating of baled jute bags destroyed two unsprinklered 1-story wooden warehouses. The fire was discovered by the plant engineer who saw the flames from the boiler house at 3:05 A.M., 35 minutes after a watchman had reportedly toured the building.

The alarm was delayed about 15 minutes while employees stretched a hose from a yard hydrant and attempted to fight the fire. By the time the public fire department arrived fire was beyond control in the 120,000 sq. ft. building of origin. Driven by a brisk wind, flames jumped a 17-ft.-wide space to another 1-story wooden warehouse. Hose streams were used effectively by employees and firemen to protect linseed oil tanks 30 feet from the fire.

July 4, Oakland, Calif. Canned Foods Distribution Center $617,000

Grocery store warehouse. Two boys, aged 6 and 8 years, admitted playing with fire in the yard of this 32,625 sq. ft. 1-story building. Fire spread through boxes and rubbish piled in the yard adjacent to the incinerator and ignited wooden pallets piled against the metal-clad rear wall. With no automatic or watchman protection in this building, fire had penetrated the wall and heavily involved the rear section before discovery by an outsider at 12:01 P.M. Open doorways in a division wall permitted fire to spread to the adjoining brick, wood-joisted section.

Wide World

Spontaneous heating of baled jute bags was the probable cause of this grain warehouse fire at Toronto, June 22. Here, as at the Hammond, Ind. food products warehouse, employees delayed the alarm until after an unsuccessful attempt to control the fire with a yard hydrant hose.

Wide World

On July 4, at Oakland, Calif., boys entered the yard of this grocery store warehouse and set fire to boxes and other rubbish piled adjacent to the incinerator. With no watchman or automatic protection, fire spread to and entered the building before discovery by an outsider.

***July 19, Evansville, Ind. A. Bromm and Co., et al. $476,000†**

Wholesale groceries; refrigerator sales; poultry processing. At 11:17 P.M. a passerby half a block away discovered fire that by then had totally involved the interior of the unsprinklered 5,300 sq. ft. 4-story brick, wood-joisted section of a 1- and 4-story grocery warehouse. The last person left the building at 5:20 P.M., and a private policeman passed by the back and front of the building between 10:15 P.M. and 11:00 P.M., and noticed nothing out of the ordinary. Contents contributing to the rapid spread and intensity of the fire included dry groceries, wrappings, matches, lighter fluid, wax and polish. Contributing weaknesses were open stairwells and elevator shafts.

Double fire doors on all fire wall openings between the 4-story and 1-story sections were keeping fire out of the 1-story section, and the principal concern of first-arriving firemen was a sprinklered paint factory across a 60-ft.-street. Playpipes directed from an aerial ladder prevented fire from entering the paint factory through plain glass windows. The second story of a 2-story brick, wood-joisted poultry processing plant across a 12-ft.-wide alley in the rear of the building of origin was severely damaged by fire that entered through plain glass windows.

The excellent protection afforded by the fire doors in the brick wall between the 4-story and 1-story sections was nullified at 11:45 P.M. when the wall toppled into the 1-story section.

April 15, Lodi, Calif. Stokely-Van Camp, et al. $260,000

Canned foods. One section of this 23,560 sq. ft. 1-story masonry, wood-trussed former winery was being used for storage of canned goods, while the other section remained vacant until it could be converted from a cork-lined winery cold room to a warehouse.

The fire originated shortly after two contractor's men arrived to remove refrigeration equipment from the basement. While one of them went to get a fire extinguisher, the other set up his cutting torch equipment and, after waiting for what he considered a reasonable time for his partner to return with the extinguisher, commenced removing an ammonia accumulator with his torch. A few minutes later he noticed cork insulation adjacent to the accumulator burning, and not having an extinguisher tried to put out the fire by rubbing it with a stick. This operation sent a shower of sparks to the ceiling. Fire flashed along the ceiling and through unprotected openings to the corklined section in the first story.

Firemen on arrival found flames and smoke issuing from one first story doorway and when they attempted to gain entrance through another found it welded closed. After cutting through the door they found canned goods piled against the doorway.

***Aug. 31, Sebastopol, Calif. Sebastopol Apple Growers Union $350,000**

600 tons dried applies; vinegar plant. Lack of automatic or watchman protection delayed discovery of this fire until it had complete control of the interior of the 65,000 sq. ft. 1-story wooden dried apple warehouse. Discovery was by police at 11:30 P.M., an hour after passersby smelled smoke but, seeing no fire, did not turn in an alarm. Lack of adequate separation of combustible buildings allowed fire to extend to and heavily damage an adjacent unsprinklered wooden vinegar plant.

Furniture Warehouses

Jan. 28, Regina, Sask. Robert Simpson Co., et al. $1,014,000

New furniture; 40 new, 100 used cars; farm machinery. The building destroyed had been built to be an exhibition building and was used at times for this purpose, but at the time of the fire was occupied by several tenants for storage purposes. At 6:33 A.M. a resident four blocks away saw fire at the 148,800 sq. ft. U-shaped 1-story wooden building and telephoned the alarm. Thirty minutes earlier another person 1½ miles away had seen the fire, but assumed that the fire department had already been notified and did not give the alarm.

The fire originated in a section of the building used for storage of new household furnishings. A watchman was supposed to make hourly tours of the area where the fire started. Why he was not the first to discover the fire remains a mystery. He claimed that he first noticed the fire at 6:15 A.M. by which time telephone wires had burned, preventing his telephoning the alarm.

Lack of sprinklers and division walls, strong winds and below zero temperatures were factors which in combination with the delayed discovery allowed the fire to spread through much of the building before fire fighters got the upper hand and managed to save a curling rink in one wing.

Leader-Post

Lack of sprinklers and division walls, in combination with delayed discovery, strong winds and below zero temperatures spelled destruction for this furniture warehouse at Regina, Sask., Jan. 28.

***Feb. 15, Richmond, Va. Morton Marks & Sons, et al. $250,000**

New furniture storage; rubber stamp mfg.; food storage. Lack of automatic protection or watchman service allowed fire to spread beyond control before discovery by a passerby at 5:52 A.M. The fire spread up open stair and elevator shafts to all stories of the 4-story brick, wood-joisted building of origin and spread through plain glass windows to an unsprinklered 3-story brick, wood-joisted building separated from the building of origin by a narrow alley. A division wall with all openings protected was a major factor in keeping fire from half the exposure.

Wired glass windows in an exposed wall kept fire from entering another exposure, also separated from the building of origin by a narrow alley.

May 3, Richmond, Va. Phillip Levy & Co. $350,000

Furniture store warehouse. The story of the fire that destroyed the 1- and 4-story brick, wood-joisted warehouse can be summed up by "delayed discovery due to absence of automatic or watchman protection." Although the building was located in a residential area, the fire re-emphasizes the warning that it is a dangerous policy to expect your neighbors to discover your fires for you. In this instance the fire had made so much headway before discovery by a cab driver at 3:54 A.M. that firemen could not enter the building and occupants of neighboring dwellings were evacuated as a precautionary measure.

Because of the head start fire had in this furniture warehouse at Richmond, Va., May 3, first arriving fire fighters could not enter the building.

***May 21, Allentown, Pa. Hess Brothers, Inc. $350,000**

New furniture and electrical appliances. Sprinklers had recently been installed in this 17,000 sq. ft. 1-story masonry, steel-framed warehouse but protection had not been extended to include a 100 ft. by 10 ft. 1-story wood-framed, metalclad shed for storage of old cartons and boxes, which almost adjoined the warehouse.

Fire set by boys in the unsprinklered shed developed unnoticed until it had burst from windows, entered plain glass windows of the warehouse and fused sprinklers. Flames had also ignited overhanging wooden eaves of the warehouse. Employees hearing the sprinkler alarm bell believed it was caused by some defect that would correct itself and did not send an alarm. Fifteen minutes later, at about the time an outsider saw the flames and pulled a street box, an office employee in the warehouse discovered the fire.

Responding firemen found most of the roof (plank deck with built-up covering) afire and flames spreading unchecked through the high-piled congested stock inside. The roof fire was out of range of the spray sprinklers and as the fire spread in the roof and through the stock so many sprinklers opened that the system was overtaxed. The high piling of the stock was felt to be an important factor in the inability of sprinklers to control the fire in the contents when flames first entered through plain glass windows.

Oct. 24, Albuquerque, N. M. American Furniture Co. $760,000†

New furniture. This high 1-story masonry, steel-joisted building was practically destroyed by fire that broke out when metal wiring conduit became detached from steel beams allowing an unprotected light bulb to fall on paper-covered mattresses. The building was not sprinklered (the owner had refused to provide the protection) and employees, instead of calling the fire department, fought the fire with extinguishers and did not give the alarm until the fire was well out of hand. Fire fighters were confronted with an intense fire in the heavily loaded building to which asphalt dripping through the metal roof deck added fuel. Eight firemen were burned by hot asphalt.

A fire door in a parapeted fire wall kept fire from an adjoining furniture storage build-

An unprotected light bulb which fell on a pile of paper-wrapped mattresses caused a $760,000 fire in this unsprinklered furniture warehouse at Albuquerque, N. M. Employees delayed giving the alarm until after they had tried to put out the fire.

Tucson Daily Citizen

Sparks from an incinerator started fire in the rear yard of this public household furniture warehouse near Tucson, Ariz., Nov. 8. After heat broke a glass block window, fire entered the unsprinklered building.

ing. A small repair room that was cut off from the rest of the building of origin by parapeted fire walls with two protected doorways was destroyed because the fire doors at these doorways had not been kept in operating condition.

Nov. 8, near Tucson, Ariz. City Van and Storage Co. $255,000

Public household furniture. This 10,000 sq. ft. 1-story masonry, wood-joisted building and a 1,000 ft. combustible addition were destroyed by fire that originated in packing cases and other debris in the yard. Sparks carried by high winds from a yard incinerator when employees were burning trash started the fire. Had the alarm been given at once it is probable the Catalina volunteer fire department could have kept the fire from the building. Instead employees elected to fight the fire with garden hoses with the result that the combustible addition was involved by the time fire fighters arrived. Shortly thereafter a glass block window in the warehouse wall above the combustible addition broke and fire entered the unsprinklered warehouse through this opening.

Glue Warehouse

***Aug. 10, Philadephia, Pa., Baugh and Sons Co. $203,000†**

The third story and roof of an unsprinklered brick, wood-joisted building were destroyed and glue in burlap bags on lower floors was badly damaged by fire that was discovered by the watchman at 10:33 P.M. while he was in another building of the sprawling plant. He had been through the second story of the building of origin 20 minutes earlier.

Firemen responded promptly but because of the dense smoke were unable to enter the building at once to locate the seat of the fire. Multiple alarms brought 16 engine companies, five ladder companies and a fire boat to the scene. The fire was brought under control in an hour and a half but during that time fire spread through the undivided third story and broke through the roof. Flames also extended to the roof and part of the exposed wall of an adjacent combustible 1-story glue warehouse. Satisfactory operation of automatic fire doors was an important factor in preventing spread to three adjoining buildings.

Grain Elevators

***May 25, Waynesboro, Ga. Cotton Producers Association $265,000; 3 killed**

600,000 bushel grain elevator with facilities for seed and corn cleaning and drying. Three employees were killed, thirteen were injured and extensive property damage was caused by a violent dust explosion that originated in the unvented basement of a 2-story reinforced concrete corn shelling section adjoining the reinforced concrete main elevator building.

Of the several substandard fire and explosion prevention features, two and possibly three were believed responsible for the explosion and the resulting deaths, injuries and property damage. First, there were no explosion venting areas by means of which explosion pressures could be released before causing extensive damage to the reinforced concrete building. Second, there were no dust collecting systems and finally, much of the electrical equipment was not approved for atmospheres containing grain dust.

Minutes before the explosion occurred an employee had entered the basement of the corn shelling section to sweep and clean this area. The death of this man prevents any definite conclusion as to what happened. It is felt, however, that the sweeping operation may have thrown dust into suspension which was ignited by electrical equipment. Switches and circuit breakers in the basement were not suitable for atmospheres containing grain dusts.

The explosion destroyed the corn shelling section, the adjoining 1-story reinforced concrete bag storage and shuck baling sections, and several communicating 1-story all-metal and masonry, wood-joisted storage and receiving areas. That part of the 7- to 10-story main building which adjoined the corn shelling section contained elevators, dryers and processing equipment. Equipment on all floors was destroyed or badly damaged. Fires broke out on all floors (as they did also in the rubble of the destroyed 1- and 2-story sections) but for the most part the flames died down in a few minutes, after consuming the dust.

Fire involving dust and the conveyor belt in the conveyor gallery above the grain bin section of the main building was extinguished with hand extinguishers. Hose streams were not used, as it was feared that the 200,000 bushels of grain in bins would become water soaked and possibly cause building collapse.

Sept. 13, near Potlatch, Idaho Latah County Grain Growers, Inc. $496,500

Elevator containing 350,000 bushels of wheat, oats and barley. Lack of water prevented firemen from saving this 100-ft.-high wood-framed, metalclad elevator. The fire originated in and was confined to the headhouse when discovered by neighbors at 4:40 A.M., and might have been extinguished had there been a suitable water supply and some means of getting the water on the fire. No headhouse sprinkler system had been installed into which firemen could have pumped the water carried on their trucks, and small hose streams directed from the ground did not reach the flames.

Normally a river flowed past the elevator from which pumpers could take suction but a six-weeks' drought prior to the fire had dried up the river.

***Nov. 5, Plainview, Texas Continental Grain Co. $400,000†**

Two elevators, one warehouse containing 433,000 bushels of grain. Two 45-ft.-high wood-framed, metalclad elevators (about 200 ft. apart) and an all-metal 35-ft.-high grain warehouse that had recently been erected between the elevators, were destroyed by fire. Origin was in a 5-ft.-wide wood-framed, metalclad conveyor gallery 36 ft. above grade that

Walter Frye

Lack of sprinklers in an overhead wood-framed, metalclad conveyor gallery allowed fire to destroy two grain elevators and a warehouse at Plainview, Texas.

Calgary Herald

The central-station-supervised automatic fire detection system which formerly had protected all parts of this unsprinklered hardware warehouse at Calgary, Alta., had not been extended to protect a newly constructed mezzanine where the fire started.

connected the two elevators and in so doing passed over the new warehouse. Fire protection for the group of buildings consisted of some fire extinguishers and unsupervised rounds by a watchman who was hired to check several industrial plants during the night.

The fire was discovered by a watchman at a neighboring plant at 11:20 P.M., three hours after the elevators had been closed for the night. The fire was then burning in the overhead conveyor. When firemen arrived at 11:23 P.M. they found the fire spreading rapidly through the conveyor, and by 11:27 P.M. the entire conveyor gallery and the headhouses of both elevators were involved. At 11:40 P.M. the conveyor gallery (supported on wooden posts) collapsed on the warehouse, crushing the roof and throwing grain dust into suspension. Flames flashed through the dust and immediately involved the interior of the warehouse.

Ample water was available for fire fighting but fire officials pointed out that because the only way to get water to the fire overhead was by bringing hoses up through the elevators, the water could not be used effectively until the three buildings were beyond saving. Lack of sprinkler protection was indicated by investigators as the principal fire protection weakness responsible for this loss.

Hardware Warehouses

April 6, Calgary, Alta. Marshall-Wells Ltd. $875,000

Wholesale hardware. The importance of extending automatic fire detection equipment to all parts of a building was emphasized by fire that destroyed this 12,500 sq. ft. 4-story brick, wood-joisted warehouse heavily loaded with hardware store stock. The absence of automatic sprinklers, and high-piling of stock were other notable fire protection weaknesses.

Firemen summoned by a central-station-supervised detection system found fire well advanced in the first story. Because of high piled stock in front of windows and difficulty in entering the building (steel roller type door, chained and locked), flames spread beyond control in the undivided building.

Investigators decided that the fire originated on a recently built mezzanine floor. The building's detection system had not been extended to protect this new addition. Consequently, the fire was not detected until sufficient heat had collected to operate detectors a considerable distance from the point of origin. Investigators also concluded that the fire was caused by spontaneous ignition of a cleaning rag stuffed into the neck of a bottle of boiled linseed oil.

Dec. 9, Lansing Twp., Mich. Michigan Farm Bureau, Inc. $492,000

Farm machinery, tires, hog feed, seed. At 7:14 A.M. a man passing this 200 ft. by 240 ft. 1-story masonry, steel-framed building saw that the undivided interior was in flames. By then there wasn't much fire fighters could do but protect exposures.

There is a difference of opinion as to the cause of the fire. The assistant manager blames it on an oil-fired space heater, while the state fire marshal and local fire chief believe that early morning winds fanned a rubbish fire into flame that had been burning 12 feet from the building on the previous evening. No watchman or automatic protection was provided.

Dec. 12, Washington, D. C. Barber and Ross Hardware Co. $350,000

Hardware stock storage with retail store. A defective electric hot plate being used by the janitor to heat water for coffee was the cause of fire that destroyed the 2- and 3-story brick, wood-joisted building heavily loaded with hardware store stock. The janitor was working in another part of the building when the fire started, and since the building was not sprinklered and the watchman was making a tour of other buildings of the company across the street, the fire had spread to cartons of stock before the watchman returned and gave the alarm at 4:10 A.M. On entering the concealed space above the suspended ceiling the fire spread throughout the undivided building.

Insecticide Warehouse

July 1, Tampa, Fla. Superior Fertilizer Co. $250,000

Insecticide storage, bagging, mixing. Fire started by lightning destroyed this unsprinklered 10,500 sq. ft. 1-story metal-framed, metalclad warehouse containing 200 tons of sulfur, 45 tons of parathion, 6½ tons of lead arsenate and various inert materials. The parathion was packaged whereas the other materials were partly stored in bulk.

Shortly after the lightning struck, fire was noticed in an open barrel of sulfur. Employees quickly extinguished this blaze with a water-type extinguisher only to find that another fire had broken out on a pile of bags in another part of the building. When an extinguisher was directed at the fire on the bags, dust was stirred up and the fire started to spread through the dust-covered interior. The fire department was telephoned and stand-

Tampa Morning Tribune

Choking fumes hampered fire fighters' efforts to extinguish fire set by lightning in this unsprinklered insecticide warehouse at Tampa, Fla., July 1.

United Press

Three Muncie firemen were killed when a fire gas explosion blew out a brick wall at this paper products warehouse, located outside the city limits. Weak water supplies from a long dead-end main and high-piled congested stock prevented control.

pipe hose lines were laid. These could not be taken inside the building because of the smoke and fumes, but were used in an effort to keep fire from spreading through a combustible passageway to the insecticide plant.

Firemen were able to take hose lines in the building but after a few minutes were forced outside by choking fumes (primarily sulfur dioxide). Fire thereafter spread throughout the dusty building and also destroyed about half of a 245-ton pile of crude sulfur just outside the warehouse and a 38-ton pile of coke. Water spray was effective in extinguishing the fire on the sulfur pile.

During the fire three firemen were overcome by fumes, and during the next few days about 30 reported to the hospital for treatment. Most were released after examination.

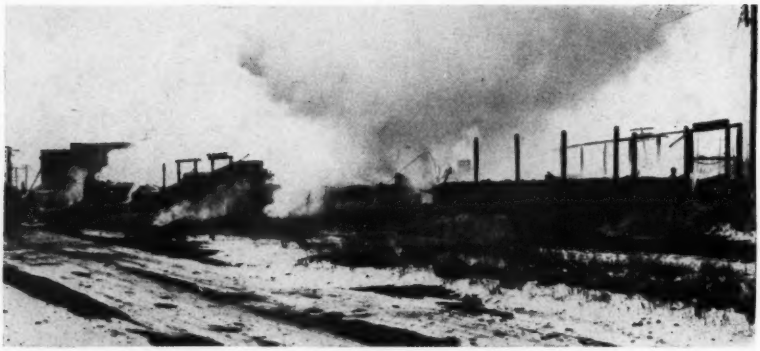
Paper Warehouses

Feb. 9, near Muncie, Ind. Schwartz Paper Co., Inc., et al. $467,000; 3 killed

Towels, cups, bags and other paper products; also, machinery and wooden furniture. Three Muncie firemen were killed when crushed under a wall while fighting a fire that destroyed about half of this irregularly shaped 60,000 sq. ft. 1-story warehouse.

These were the conditions that resulted in the loss of life and property damage. The building was not sprinklered, was located outside the city limits where there was no agreement that a fire department would respond to an alarm, the property had no fire brigade and for fire protection relied on five yard hydrants on a dead-end 6-inch main fed by a 3,200-ft.-long 8-inch city main. Masonry walls, in some instances parapeted, divided the floor space into different storage areas but in no instances were doorways in the walls protected by fire doors. In the paper storage areas (most of the building) a single center aisle was the only clear space in the otherwise solidly packed 20-ft.-high piles of cartons of paper products.

The fire was discovered at 9:30 A.M. when a lift truck operator drove his vehicle into one of the paper storage sections for the second time that morning. Flames were then breaking out of a pile of cartons at roof level. (On questioning, the lift truck operator remembered that he had heard a crackling sound on his first trip.)



Wilkes-Barre Times-Leader Evening News

A sprinkler system in this plumbing supplies warehouse had been out of service since 1927. Fire was out of control in this Wilkes-Barre 32,000 sq. ft. building when discovered by an outsider at 2:38 A.M. on February 5, 1955.

The Muncie fire department was telephoned as employees ran a hose line from one of the yard hydrants (only one hydrant had hose) but this single hose stream was unable to check the fire. Additional yard hydrant connected hoses were laid as engine companies arrived but fire fighting was ineffective due to the high-piled congested stock (hose streams had to be deflected off the ceiling) and weak water supplies (when a 1,000 gpm pumper was connected to a yard hydrant practically all yard hydrant streams were left without water). The three men who lost their lives were about to take a hose into an as yet uninvolved section of the building when an explosion of fire gases blew out the brick walls.

Helped by a favorable wind Muncie and Yorktown firemen made effective use of their limited water supply and managed to save about half the warehouse.

Nov. 29, Reading, Pa. M. J. Earl, Inc. $300,000

Bags, straws, plates, other paper products. Fire of undetermined cause originated in the second story of this 50 ft. by 110 ft. 4-story brick, wood-joisted warehouse. With no automatic or watchman protection provided, fire had involved a considerable quantity of stored paper products before discovery by an employee at 3:18 P.M. Flames broke plain glass windows opening into an air shaft and extended up the shaft to windows at the fourth story level. The second and fourth stories were burned out. The first and third were not burned but were water-soaked as 13 large hose streams were used.

Plumbing Supplies Warehouses

Feb. 5, Wilkes-Barre, Pa. A&G Plumbing Co., et al. $257,500

Retail and wholesale plumbing supplies; oil and grease storage; brewery keg and bottle storage. Fire that started in the first floor of the 2-story building of mixed construction was through the roof when discovered by a railroad crossing gateman at 2:38 A.M. Failure of the merchant patrolman to detect the fire when he entered the building and punched his clock at two stations 50 minutes earlier was probably due to the fact that his prescribed tour did not provide complete coverage of the building.

The 32,000 sq. ft. building housing three tenants contained numerous unprotected horizontal and vertical openings and was without sprinkler protection. A sprinkler system was installed but had been out of service since 1927.

Nov. 2, New York (Manhattan), N. Y. Davis & Warshaw, Inc., et al. $264,000

Wholesale plumbing and heating; handkerchief storage. Sometime during the night fire broke out in a storage room in the fifth story of this 6-story brick, plank and timber building. Since no automatic protection or watchman service was provided, discovery was delayed until an employee reported for work at 5:57 A.M. By then fire had spread through open elevator shafts to the sixth, second and third stories.

Rag Warehouse

July 19, Baltimore, Md. S. Schapiro & Sons, Inc. $564,000†

Baled rags. Improper stock piling and high ceilings were responsible for the extensive damage resulting from fire in this sprinklered 1-story brick, steel-framed building. The building comprised a single fire area of 120,000 sq. ft. with ceiling heights ranging from 36 ft. to 55 ft. Baled rags were stored in large piles 25 ft. to 30 ft. high without adequate aisles between piles.

Originating within one of the piles, a smoldering fire developed for some time without operating sprinklers because the high ceilings and lack of fire walls or draft stops permitted dissipation of heat. When sprinklers finally operated at 2:25 A.M., sufficient heat had accumulated at ceiling height to operate 196 sprinklers. Firemen, summoned by the central-station-supervised waterflow alarm, found the building charged with smoke and a deep-seated fire within the piles of rags. With their normal water supply from street mains augmented by two pumpers connected to the fire department connection, sprinklers held the fire from breaking into the open and permitted firemen to ventilate the building and direct large hose streams into the piles of bales. This procedure extinguished the fire but in the process a pile of bales toppled, injuring several firemen.

Despite the fact that the building was equipped with floor drains most of the bottom bales in the large building were damaged by water because skids were not used.

Rubber Products Warehouse

***June 23, New York (Manhattan), N. Y. Carlyle Rubber Co., et al. $250,000**

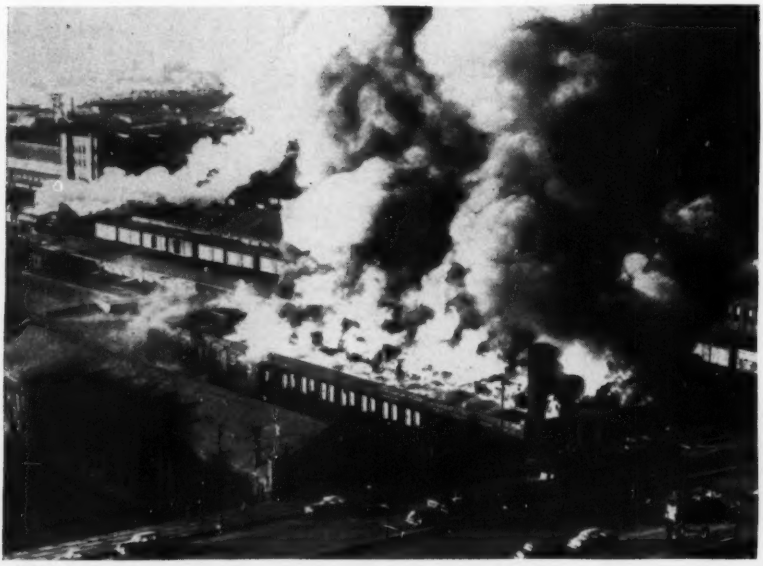
Miscellaneous rubber products. Originating in the third story, fire extended to the fourth and fifth stories and through the roof of the 160 ft. by 25 ft. 5-story brick, wood-joisted building before discovery by a passerby at 1:50 A.M. By means of a common attic fire spread to an adjoining building. Neither of the buildings involved was protected by sprinklers, automatic detection system, or a watchman.

Wide World

Two buildings in downtown New York were severely damaged by fire that originated in the third story of a rubber products warehouse. Neither building was sprinklered, had automatic detection equipment or a watchman. The fire was beyond control in the building of origin when discovered by a passerby at 1:50 A.M. and spread via an undivided attic space to the adjoining building.

William C. Peck

The owner of this rug warehouse at Milltown, N. J. may have been under the illusion that a man who slept in the building would assure prompt fire detection. The fire was discovered by an outsider and the pseudo watchman awoke just in time to escape.



United Press

There was only one large loss terminal warehouse fire in 1955 as contrasted with five in 1954 and four in 1953. The 1955 fire occurred at a railroad freight terminal at Chicago, Dec. 26.

Rug Warehouses

Jan. 31, Columbus, Ohio Rite Rug Company $279,500

Carpets and other floor coverings. Ignition of joists by an overheated pipeless furnace that was in poor condition and under repair was the probable cause of fire that originated in the basement of this 187 ft. by 40 ft. 3-story brick, wood-joisted building. The fire was beyond control when discovered by a taxi driver at 1:40 A.M. and destroyed the building because of a combination of several notable fire protection weaknesses: no sprinklers, no automatic fire detection system or watchman, open stair and elevator shafts, and an undivided attic.

April 1, Milltown, N. J. New Brunswick Rug Co. $341,000

Linoleum, asphalt tile, rugs. At 2:30 A.M. an outsider discovered fire that because of its headway eventually destroyed the heavily loaded 17,500 sq. ft. 1- and 2-story wooden building. No fire walls were provided, stairwells were open and the closest resemblance to private fire protection was a man who slept in the building. The building owner may have been under the illusion that this man provided watchman protection. He awoke and fled before his escape was cut off.

Terminal Warehouse

Dec. 26, Chicago, Ill. Wabash Railroad, et al. $500,000

Freight terminal. An unexplained delay in discovery by the building watchman allowed fire that eventually destroyed the 100 ft. by 300 ft. 2-story brick, wood-joisted building to involve most of the first story before discovery at 7:56 A.M. The building was unsprinklered, heavily loaded with miscellaneous freight and comprised a single fire area of 60,000 sq. ft. (see photo on opposite page).

Miscellaneous Storage

***Feb. 5, Middletown, Ohio Armco Steel Corp. $475,000**

Miscellaneous storage, including office supplies, metal parts, motors, gears, janitors supplies, flammable liquids. Two adjoining and communicating unsprinklered warehouses were heavily damaged by fire that originated at a receiving room door in a 143 ft. by 50 ft. 1-story steel-framed, metalclad building.

The fire apparently originated in an excelsior bin and may have been caused by careless smoking. Discovery was by employees at 10:04 A.M. Flames spread rapidly through

News-Journal

Fire originated in an excelsior bin in the receiving room of one of the two miscellaneous storage buildings destroyed at Middletown, Ohio, Feb. 5. Neither building was sprinklered, both were congested with wooden storage bins and shelving, and the fire wall between the two buildings contained two unprotected doorways.

Unsupervised watchman service proved worthless at this oil well supplies warehouse at Duncan, Okla. The fire was beyond control when discovered by an outsider.

the building congested with wooden storage bins and shelving, and entered an adjoining 120 ft. by 50 ft. 2-story brick, wood-joisted warehouse through two unprotected doorways in the fire wall between the two buildings. Inadequate water volume from the private hydrants and lack of a connection between yard mains and public mains hampered fire fighting.

July 7, Chicago, Ill. Chicago Distribution Warehouse Co., Inc., et al. $280,000

General storage including chemicals, household equipment and furniture. This sprinklered 1- and 2-story brick, wood-joisted warehouse and its contents were damaged by fire that apparently smoldered in high-piled upholstered furniture before bursting into flame. Since the building was protected by an unsupervised sprinkler system in operating condition and since a watchman had entered the 20,000 sq. ft. building sometime before the fire was discovered, the origin and development of the fire was carefully investigated.

Investigators concluded that any one of several possible ignition sources (e.g. careless smoking, backfire of a lift truck) had started a smoldering fire in the high-piled upholstered furniture. Sprinklers are believed to have operated but because of the congested high-piled stock, water probably did not reach the deep-seated fire, and smoke and heat continued to be generated until a series of fire gas explosions at 10:55 P.M. attracted the watchman. (The watchman had entered the building a short time prior to the explosions but apparently was in a section of the building remote from the fire.) Flames and smoke were so dense when the watchman investigated that he was forced from the building and requested neighbors to telephone an alarm. The fire spread rapidly through the building before apparatus arrived, opening 250 sprinklers which overtaxed the water supply from city mains. The first engine company pumped into the sprinkler system but by then the fire was so intense the sprinklers were ineffective, and a four-hour attack with large hose streams was required to bring the blaze under control.

The manually operated booster pump for the sprinkler system was not put in operation during the fire.

July 12, Duncan, Okla. Halliburton Oil Well Cementing Co. $548,000

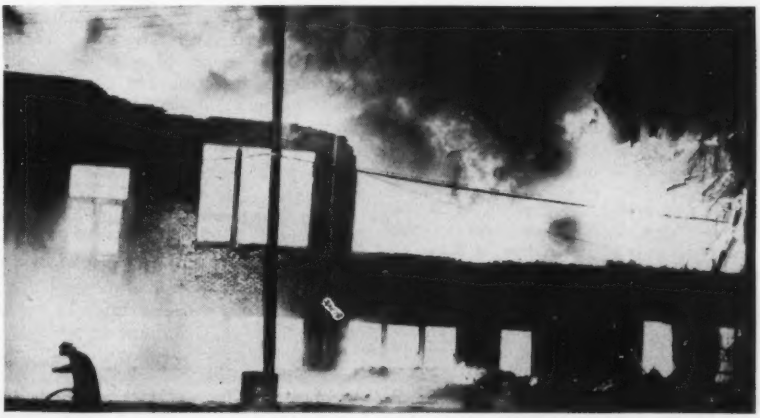
Machinery, lumber, paint, rubber. Unsupervised watchman protection proved worthless as far as prompt detection of fire that destroyed this warehouse was concerned. The fire that destroyed this warehouse was beyond control in the undivided and unsprinklered 12,500 sq. ft. 1-story noncombustible building when an occupant of another building looked out and saw the flames at 8:00 P.M.

Ten Schools Destroyed – $3,000,000 Loss

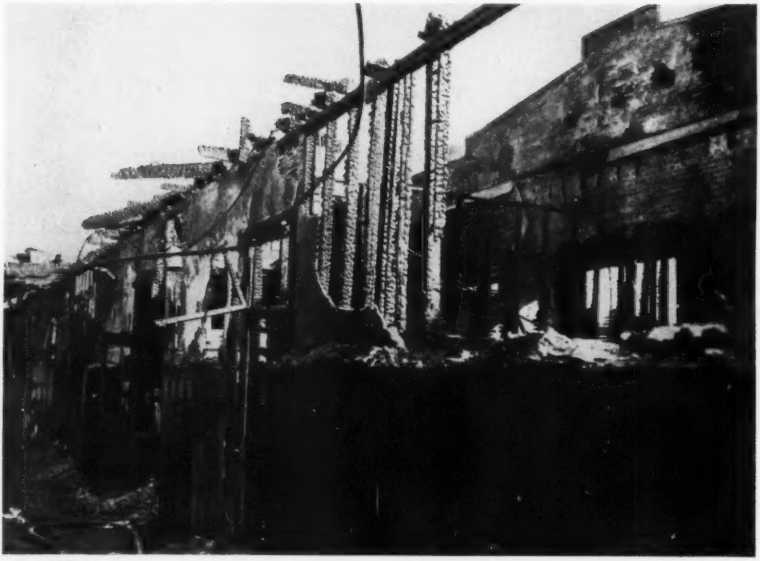
The ten largest school fires during 1955 caused $3,000,000 loss, much of which was not covered by insurance and which therefore placed an added strain on already bulging school budgets. Whether or not the losses were insured, the school authorities were faced with the immediate task of finding classroom space in existing buildings for the burned-out students. The only fortunate feature of these fires was the absence of fatalities and only two injuries to firemen.

Although occurring from Alaska to Georgia and in schools ranging from the elementary school to the college classroom building, the factors responsible for these ten fires were about the same in all cases. Consider, for example, that not one of the schools was in operation when the fires were discovered, that all except two buildings had been unoccupied for at least an hour prior to discovery, and that none of the schools had watchman protection, a central-supervised automatic fire detection system or an automatic sprinkler system. This experience agrees with large loss fire experience of other years and is further evidence, if any is needed, that the first requisite of a program to protect schools against large fires is provision of a reliable and effective means for discovering and extinguishing fires promptly.

Construction features of the ten school buildings also had much to do with the fact that they were involved in disastrous fires. All occurred in buildings with combustible interiors (brick, wood-joisted) and all contained structural weaknesses contributing to fire spread, the most notable weaknesses being nine instances of absence of fire division walls where such walls would be called for by sound fire protection practices, unprotected vertical openings (nonfirestopped walls, unenclosed stairwells) in all eight of the multistoried buildings and nonfirestopped ceiling spaces through which fire spread in four cases. Heating or ventilating ducts also spread flames in notable instances.



Classroom space for 350 students was the immediate problem faced by the Harrisburg, Ill., School Board after fire destroyed the town's junior high school.



Carmi Times

At Carmi, Ill., Jan. 3, fire originated in the boys' toilet in the basement two hours after the crowd at a night basketball game broke up.

Jan. 1, Harrisburg, Ill. Harrisburg School District No. 43 $283,000

Junior high school. School boards everywhere should ponder the problem that confronted the Harrisburg School Board after fire destroyed this 2-story brick, wood-joisted school building. Not only did the Board have the immediate problem of finding classroom space for 350 students, but in addition it had to obtain $162,000 to help pay for a new building and equipment, estimated to cost $350,000. The burned building (built in 1921) and equipment were insured for $188,000.

When pondering this problem as it may affect their own schools, school boards should consider the cost of installation of automatic fire protection. Because no such protection was provided at the Harrisburg school, the fire spread beyond control before being noticed by police in a cruiser at 2:30 A.M.

Unprotected doorways between the old building where the fire started and a new addition not yet completed allowed fire to enter and cause considerable damage to the second story of the new addition (photo p. 363).

Jan. 3, Carmi, Ill. Carmi Township High School $250,000

High school. At 1:10 A.M., about two hours after a basketball game in the building had ended, passersby discovered fire that was by then beyond control. No automatic protection or watchman service had been provided to assure prompt detection of any fire that might break out. The fire originated in the boys' toilet in the basement and before discovery had spread through nonfirestopped walls to the undivided attic.

Feb. 4, Longueuil, Que., Iberville LeMoyne School $300,000

Private day school. During construction of an addition to this school a white hot rivet fell into a hole that had been made in a wall of the old building. Construction men fought the fire that broke out in the wall with first aid equipment and did not telephone the fire department until fire was spreading through nonfirestopped walls and ceiling spaces. Construction work contracts should be written to cover fire safety subjects.

Feb. 12, Mitchell, S. D. Dakota Wesleyan University $250,000

Administrative offices, classrooms, 32,000 volume library, Indian relic collection, U. S. government records depository. If a monetary value could be placed on the irreplaceable records and items destroyed in this fire the loss would far exceed $250,000. As one professor said, "A tape-recorded interview with a historical figure now dead is priceless and no money value can measure its worth." Records in fire-resistive vaults and safes were saved. Except for some student records rescued by an instructor everything else was lost.

The fire originated in the library basement of the 3-story stone, wood-joisted building from an undetermined cause and spread rapidly through the undivided building.

It is incredible that valuable records, books and relics should have been housed in a building without sprinkler protection. The building had been built 47 years ago to replace a college building destroyed by fire in 1888. Two students lost their lives in that fire.

Feb. 23, Independence, Iowa Independence High School $287,500

High school with gymnasium and auditorium. Originating in the library on the first floor, fire entered old unused hot air ducts that extended from the basement, through the library to the attic of the 2-story brick, wood-joisted building. Summoned by a neighbor at 8:05 P.M., firemen extinguished the fire in the library without much difficulty, but were unable to check the fire spreading through the old heating duct before it burst into the undivided attic and broke through the slate roof. No watchman or automatic fire protection was provided for the 53,000 sq. ft. building.

May 17, Waterbury, Conn. Walsh School $274,000

24-classroom public grammar school. One of the few schools in Waterbury without sprinkler protection in the basement was destroyed by fire that originated in a basement storage room. During the evening passersby smelled smoke but no one gave the alarm until 1:25

Wide World

This Waterbury, Conn., grammar school fire originated in the basement. An unused heating system duct and a concealed space behind a built-in bookcase provided the route by which the fire spread to the undivided attic.

A.M. when a neighbor was awakened by the sound of breaking glass. By then the fire had spread through an unused duct of an old unused heating system to a first story classroom. A built-in bookcase on one wall that extended up through all stories without firestops offered a pathway for the fire to the undivided attic where it mushroomed.

Nov. 1, near Anchorage, Alaska Talkeetna School $500,000

Public elementary school. With no watchman or automatic protection to detect a fire promptly, fire that apparently originated in the boiler room in the first story burned for at least an hour before discovery by a neighbor at 1:10 A.M. By that time fire had burned through the wooden ceiling of the boiler room and entered the undivided attic which extended over all parts of the 300 ft. by 60 ft. 1-story masonry, wood-joisted building. The attic was formed by the building roof and the combustible fibreboard ceilings of the classrooms and corridors. Ceiling ventilators in all rooms that vented to the attic provided ready means for flames to enter classrooms.

Nov. 7, Elberton, Ga. Central School $275,000

Classrooms and auditorium. Absence of sprinklers permitted fire to destroy this 23,500 sq. ft. 2-story brick, wood-joisted building and an adjoining auditorium. Other important fire protection weaknesses responsible for the total destruction were lack of watchman service or a supervised fire detection system, nonfire-stopped walls and ceilings, and unprotected openings between the classroom section and the auditorium.

The fire apparently originated in the bookkeeping classroom from which it spread up open stairways and within walls and above ceilings to all parts of the classroom area. The fire was beyond control when noticed by a passerby at 6:10 P.M. (20 minutes after the last person left) and later spread through unprotected doorways to the auditorium.

Nov. 16, Milan, Tenn. Park Avenue Elementary School $250,000

Classrooms and gymnasium. Classroom facilities for 378 students were wiped out when fire destroyed this unsprinklered 216 ft. by 110 ft. 1-story brick, wood-joisted building. The fire originated in the basement adjacent to the not-cut-off furnace room in an area where seats, tables and other school supplies were stored. Fire was spreading through the undivided basement when discovered by an outsider at 7:00 P.M., an hour after the last person left the school. Ten minutes after the first engine company arrived (there was a delay in response due to a blown fuse in the fire siren circuit) the roof started to cave in.

Dec. 4, Stockton, Ill. Community Unit School Dist. No. 206 $255,000

Grade and high school. Two of the three sections of this 11,000 sq. ft. 1- and 2-story brick, wood-joisted school were practically destroyed by fire that must have been burning for some time before the school janitor looked out of his home at 5:45 A.M. and saw smoke pouring from school building ventilators. Such delayed discovery fires are not infrequent in schools without sprinkler protection, an automatic fire detection system or watchman service.

The fire originated in a basement storeroom where paint, floor oil and other flammable liquids were improperly stored, and had burned up through wood flooring and into the first story before discovery. Open stairways, oil-soaked floors, combustible fibreboard ceilings and concealed ceiling spaces contributed to the spread of fire through the building.

A masonry wall with unprotected doorways separated a new gymnasium from the area of origin. Fortunately, the fire had not passed through these doorways before discovery, and firemen were able to make a stand with hose lines at these openings thus preventing fire from entering the new gymnasium. Water damage, however, was heavy and left the gymnasium floor with a "washboard effect."

Nine Residential & Institutional Large Losses

The nine large loss residential occupancy fires in 1955, two less than in 1954, included two in apartment houses, two in dormitories, two in homes for the aged and three in hotels. There was one death, 35 injured (all fire fighters) and $3,434,000 loss. The one fatality occurred in a St. Paul, Minn. apartment building when a woman trying to escape via an elevator was trapped when the elevator stopped between floors.

All but one of the buildings were occupied at the time of the fire, yet detection was delayed in seven, evidence that the average occupant of residential occupancies is not an adequate substitute for standard watchman protection or a properly installed and supervised automatic fire detection system. None of the buildings was equipped with automatic detection systems and watchman protection was provided in only one, the temporarily unoccupied home for aged at Nicolet, Que. In that instance the watchman made unsupervised rounds every other hour, instead of at hourly intervals.

If prompt detection is so vital, one may ask why two of the large loss residential fires, where discovery was reasonably prompt, were in the records of last year. An explanation will be found in the reports of the two apartment house fires where it will be seen that other factors —lack of sprinklers, open stairways, nonfirestopped walls—also have much to do with the size of a fire.

None of the nine buildings were protected by a complete sprinkler system. Part of the attic of the Topeka, Kan.,

Associated Press

This apartment building at St. Paul, Minn., was the scene of the only residential large loss fire in which a death occurred last year. Careless disposal of a cigarette in a pan of rags soaked with varnish remover was the probable cause.

home for aged was sprinklered, but the fire originated in an unsprinklered area and eventually spread into the sprinklered section where sprinklers were overpowered because of intensity of the exposing fire and weak water supplies.

There were 20 instances of structural weaknesses contributing to fire spread. Division walls, for example, were notable by their absence in six cases, e.g., the undivided attic at the Topeka home for aged. Fire spread up open stairways and elevator shafts in six fires (see the Meadville, Pa., hotel fire), and spread through nonfirestopped walls twice (see the Nicolet, Que., home for aged).

Apartment Buildings**

Aug. 13, Syracuse, N. Y. LaVoy Building $250,000

Fifteen apartments, three stores. Rubbish stored near the incinerator was ignited by sparks escaping from the open door on the incinerator in the basement of this 12,300 sq. ft. unsprinklered 3-story wooden building. Fortunately, the fire had not been burning long before discovery by a passerby at 12:22 P.M., since it was still confined to the vicinity of the not-cut-off incinerator. All occupants were able to escape before flames spread up through open stairways and through nonfirestopped walls to the attic and room.

In his report, the fire marshal stated, "This building has been a continual source of annoyance to the Fire Department down through the years. Since 1949 we have sent a yearly report asking for a sprinkler system throughout."

Dec. 13, St. Paul, Minn. Willard Apartment Hotel, et al. $324,500; 1 killed

Apartments and stores. One person was killed and the sixth story, part of the fifth, and the roof were destroyed by fire that broke out while a painter was removing varnish from the floor of an apartment of the unsprinklered 6-story brick, wood-joisted building. To remove the varnish the painter used a mixture of a gallon of varnish remover and a gallon of turpentine. A dishpan was used to collect soaked rags and floor scrapings. The fire broke out in the dishpan while the painter's back was turned and spread rapidly as he fled to safety. The painter admitted that he disposed of a cigarette butt in the dishpan.

A 53-year-old occupant of a sixth story apartment was trapped and asphyxiated in an elevator when the descending elevator stopped between the sixth and fifth stories.

Dormitories

Sept. 29, Schefferville, Que. H. J. O'Connell, Ltd. $640,000

Eight bunk houses, two offices, one warehouse, one work shop. Living quarters for a construction crew at this recently opened iron ore site consisted of a central 8,000 sq. ft. wooden mess hall and kitchen building flanked on two sides by rows of seven 1,680 sq. ft. wooden bunk houses. These and two similarly constructed office buildings were all connected to the mess hall by covered wooden passageways.

The fire originated in the open space beneath the kitchen floor and involved escaping propane gas (propane for gas-fired hot water tanks directly above the location where the fire started was supplied from a bank of 18 cylinders outside the building). The ignition source was not determined, but the escaping gas is attributed to the substandard practice of connecting the cylinders directly to the burners without an intervening pressure regulator.

Had an organized fire brigade and a reliable water supply for fire fighting been available it is probable that the fire could have been checked before sweeping through the combustible and interconnected buildings. There was no fire brigade and two portable pumps could not be started. Employees did discharge 84 foam and vaporizing liquid extinguishers but these had no appreciable effect on fast spreading fires.

With the nearest water 2,000 ft. away over rough terrain, the local volunteer fire department was severely handicapped but did manage to save parts of several buildings that were either on the windward side of the fire or were separated from the main group.

An asterisk (*) before a listing of a fire indicates fire spread to other buildings.

**See also pages 324 to 341 for other fires involving apartments over stores.

Oesterwinter

All occupants of this unsprinklered dormitory at a Quebec, Que., monastery were at supper in the first story when fire coming from third story windows was discovered by a cab driver. Careless smoking was the probable cause (see report, p. 370).

United Press

At this Topeka, Kansas, home for aged, sprinkler protection was provided for the wing at right only. Originating in an unsprinklered part of the undivided attic, the fire had entered the sprinklered attic section and was overpowering poorly supplied sprinklers when this photo was taken (see report, p. 370).

Dec. 8, Quebec, Que. Blessed Sacrament Monastery $350,000

Dormitory and classrooms. Careless smoking was the most probable explanation of fire that originated in a third story rest room while all occupants were in the first story for the evening meal. The fire had made sufficient headway to be noticed by a passing taxi driver at 6:28 P.M. Lack of sprinklers, strong winds and unprotected vertical openings contributed to the spread of fire through the 50 ft. by 125 ft. 5-story brick, steel-framed building.

Homes for Aged

July 26, Topeka, Kans. Methodist Home for the Aged $344,000

The fallacies of placing a combustible roof on an otherwise fire-resistive building and of providing sprinkler protection for only one-eighth of the attic were among the lessons emphasized by fire that destroyed the entire roof of the 29,000 sq. ft. 4-story building.

Responding to an employee's alarm at 10:23 A.M. firemen found fire in the unsprinklered attic of one wing. Efforts to bring the fire under control with two hose lines brought up through the building and by a ladder pipe were not successful, due to weak water supplies and inaccessibility of the fire beneath the slate roof. With fire dropping down elevator shafts, firemen, police and attendants then commenced the evacuation of the 286 inmates (about 100 were bed patients). That this was accomplished without injury to anyone was due in part to smoke partitions in corridors that kept open stairways relatively free from smoke.

In the meantime fire was spreading unchecked through most of the undivided attic where personal belongings of inmates were stored. The brick, wood-joisted wing (the original building) had recently been sprinklered. Fire worked its way into this wing during the first hour of the fire, but after a pumper connected to the sprinkler system a notable reduction in intensity was noted. Although the roof in this sprinklered section eventually collapsed, the fire did not get below the attic.

The fire extended down elevator shafts in the fire-resistive section but did not seriously involve the lower stories. Wired glass on elevator shaft doors melted in some instances, but firemen posted at these openings prevented fire from getting a foothold in the corridors.

***Dec. 31, Nicolet, Que. Mother House of Grey Nuns $350,000**

The unsprinklered 21,000 sq. ft. 4-story masonry, wood-joisted building that was destroyed by this fire and the adjoining heavily damaged 10,000 sq. ft. 4-story reinforced concrete building had been evacuated by approximately 350 old people and attendants following a landslide into the Nicolet River 600 ft. away on November 12. The evacuation was considered necessary since the brink of the gap left by the landslide was only 125 ft. from the buildings. Following the landslide, the buildings had been locked up and put under the care of watchmen who made 2-hourly tours.

At 1:20 A.M., one hour and 50 minutes after his 11:30 P.M. tour, the watchman smelled smoke while in the detached boiler house and traced it to the 4-story masonry, wood-joisted building. The alarm was telephoned at once. On entering the smoke-filled building fire fighters heard fire burning in the basement and within walls, but were immediately forced outside by the smoke. Hose streams were directed through first story windows (there were no basement windows) but an hour elapsed before flames finally became visible,—in the second story. By then the fire had undoubtedly spread to most of the building via concealed wall spaces, since soon after flames became visible the entire building was afire. At this stage a private fire brigade in a neighboring town was asked to send help.

Seventeen hose streams eventually brought the fire under control but not before it had heavily damaged the adjoining 4-story fire-resistive building. The manner in which fire entered this exposure will be no surprise to fire protection engineers on learning that openings in the wall between the two buildings were protected by fire doors on only one side, and that a temporary wood peak roof had been placed on the exposure when built in 1939 in anticipation of the day when an additional story would be needed. The exposure fire ignited and destroyed the wood roof of the otherwise fire-resistive building and also penetrated the single fire doors, causing considerable damage in all stories.

Hotels

***March 31, Atlantic Beach, N. C. Ocean Beach Hotel, et al. $375,000**

Hotel, bathhouse, two restaurants. Lack of public and private fire protection spelled de-

struction for four buildings, including a 185 ft. by 45 ft. 3-story masonry, wood-joisted hotel. The fire started in an old wooden bathhouse of 12,000 sq. ft. area across an 8-ft.-wide alley from the hotel. When discovered by a hotel bellboy at 5:45 A.M., the bathhouse and two adjoining wooden restaurant buildings were involved and a brisk wind was carrying the fire rapidly toward the hotel.

The approximately 35 guests were aroused in time to escape safely and the Morehead City Fire Department, five miles away was called. Response was made by this and other departments, but fire was sweeping through the unsprinklered hotel before apparatus was on the scene. With the nearest water for fire fighting a creek ½ mile away there was a further delay until pumper relays could be set up.

Oct. 14, Lakewood, N. J. Grossman Hotel $300,000

140-room seasonal hotel. While employees were readying this 32-year-old hotel for opening a few weeks hence, fire broke out in the fifth story of one wing. The fire had been burning for some time before being seen by an employee working in another part of the building. Professional fire fighting was delayed as employees tried to put out the blaze with first aid equipment before giving the alarm. The principal fire protection weaknesses, however, that resulted in the total destruction of the 37,500 sq. ft. 5-story masonry, wood-joisted building were the absence of sprinklers and fire division walls. Fire had involved most of the top story by the time the first fire apparatus arrived and soon broke through the roof and extended to lower stories through open stairways.

The effectiveness of the many mutual aid companies that responded was greatly reduced by the poor public water supply.

Nov. 2, Meadville, Pa. Lafayette Hotel, et al. $500,500

Hotel, five stores. Fire discovered in a second-story linen closet at 2:23 A.M. by a hotel employee spread up through an adjacent elevator shaft and through corridors and stairways before many of the 58 occupants could make their escape. Several were trapped in their rooms and some of these had to be persuaded not to attempt to descend down bed sheet ropes and to wait for fire department ladders. All were safely evacuated from the hotel occupying the three upper floors of the unsprinklered 4-story brick, wood-joisted building.

Tribune Publishing Company

These guests of a Meadville, Pa., hotel were trapped in their rooms by fire that originated in a second story linen closet and spread through an open elevator shaft and stairways to upper story corridors of the unsprinklered 4-story brick, wood-joisted building. Fire fighters safely evacuated all those trapped.

Seven Garages — $2,450,000 Loss

Four in 1953, five in 1954, seven in 1955 is the record of "large loss" garage fires during the past three years. Granted that the number in any one year is small, especially if the total number of garages is considered, the steady increase in the number of bad garage fires should prevent complacency. Now is the time to do something about garage fire protection.

There were certain striking similarities between the large loss garage experience of 1955 and 1954. In the discussion of the 1954 experience in the January, 1955 QUARTERLY attention was called to the fact that hazards associated with flammable liquids storage and handling were a factor in five of the six fires and in one instance a flammable liquid was responsible for the start of a fire. In 1955, flammable liquids influenced fire-spread in six of the seven garage fires. At Bridesburg, Pa., April 29, fire followed an explosion of a gasoline fuel tank being repaired with a welding torch. The welder suffered fatal burns.

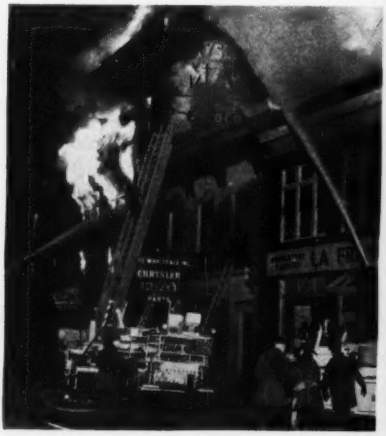
In 1955, as in 1954, none of the buildings involved was sprinklered or had automatic fire detection equipment, and in 1955 six fires occurred after the garages had closed for the night (five in 1954).

Watchman protection was provided at two of the seven garages destroyed in 1955. No one seems to know why the watchman did not discover and report the fire promptly at St. Boniface, Man., Jan. 25, although one can assume that the watchman was not making complete hourly tours of the building on the night of the fire. At Quebec, Que., Sept. 16, the garage watchman went home at midnight, four hours before the fire was discovered by a passerby.

Jan. 25, St. Boniface, Man. Commonwealth Construction Co. $250,000

Road construction equipment repair and storage. Heavy damage was inflicted on bulldozers, draglines and other construction equipment when fire destroyed the large unsprinklered wooden building. Hydraulic fluid and oil stored in the building intensified the fire.

A watchman patrolled the building, but for some unexplained reason he did not discover the fire, the alarm being turned in at about 5:30 A.M. by an outsider. Further delay in fire department response resulted because the person who discovered the fire notified the wrong fire department.



United Press

The Baltimore garage fire was one of six that broke out after the garage had closed for the night. No watchman or automatic fire protection was provided.

Jan. 31, Baltimore, Md. Martin Motors Corp. $683,500

Sales and service. Thirty-five hours after this garage had closed for the weekend, a neighbor was awakened by flames sweeping through the second story of the unprotected 4-story section of the 2- and 4-story brick, wood-joisted building. The 4-story section consisted of two buildings with unprotected openings between them in all stories. A few minutes after fire fighters arrived and ventilated the building fire spread through unprotected ramps and stairways to upper stories.

Openings between the 2-story and 4-story sections were protected by double fire doors.

Oesterwinter

The watchman at this Quebec garage completed his work at midnight and went home. The fire was discovered by a passerby at 4:07 A.M.

The doors held but when an upper part of the wall of the 4-story section fell on the 2-story section, fire entered the second story.

Feb. 14, Port Huron, Mich. Cawood Auto Co. $396,500

Automobile sales and service. After the garage had closed for the night and while company employees were attending a meeting in the office in the front part of this 600 ft. by 200 ft. 1-story building, fire broke out in the rear repair section. Since no watchman or automatic protection was provided it was not discovered until 9:23 P.M. when one of the men attempted to open the door between the office and repair department. Because of the pressure of heated gases, he had all he could do to push open the door. Flames immediately flashed throughout the unsprinklered repair section and were coming through the roof when fire fighters arrived. Thirty-six cars were destroyed.

***April 29, Bridesburg, Pa. Evans Trucking Co., et al. $250,000; 1 killed**

Truck garage; machine shop. The owner of the truck garage received fatal burns when the vehicle tank he was welding exploded and showered him and his garage with burning gasoline. With his clothing aflame he ran from the garage. A passerby beat out the flames and took him to a hospital but he did not recover.

The fire quickly enveloped the unsprinklered 1- and 2-story brick, wood-joisted garage and entered the second story of an adjacent machine shop through plain glass windows before firemen arrived. Both buildings were destroyed.

***Sept. 16, Quebec, Que. Morissette Automobiles, Inc., et al. $271,000**

Auto sales and service. At 4:07 A.M., four hours after the watchman completed his night's work and went home, a passerby discovered fire beyond control at the 14,400 sq. ft. unsprinklered 1- and 2-story brick, wood-joisted garage. Reports state that an adjoining garage was moderately damaged but do not indicate how the fire entered the exposure.

Oct. 31, St. Charleston, W. Va. Rhodes-Walker Chevrolet Co. $306,500

Automobile sales and service. While delivering his Monday morning papers a news-

*Indicates fire spread to other buildings.

*Indicates fire spread to other buildings.

boy discovered fire that was by then beyond control in the undivided and unsprinklered 20,000 sq. ft. 1-story brick, steel-trussed building. When firemen responded at 4:30 A.M. their principal problem was to prevent wind-carried sparks from setting fire to exposures.

Reports brought out the fact that absence of automatic protection and watchman service were the principal fire protection weaknesses responsible for the destruction of this building, but also indicated that other contributing factors were an accumulation of vapors in the building from paint that had been put on the floor the previous day (no ventilation had been provided), and the combustible fibreboard ceiling.

Dec. 30, Douglas, Ga. John Adams, et al. $293,500

Auto sales and service; storage of 33 new and 32 used cars; bulk corn storage. Except for the 6 weeks' tobacco sales season when this building was occupied as a tobacco sales barn, it was used in part as an automobile sales and service garage and for the storage of cars and bulk corn.

The fire occurred during the off season for tobacco sales and was coming from windows when discovered by a passerby at 10 P.M.—not surprising if the lack of automatic protection, watchman service, and division walls for the 300 ft. by 156 ft. 1-story masonry, wood-joisted building is considered.

Six Largest Lumber Yard Fires in 1955

Hamilton Spectator

The six large loss lumber yard fires all broke out after the yards had closed for the night. This one at Hamilton, Ont., was discovered at 7:51 P.M., two hours and 21 minutes before the watchman was scheduled to report for duty.

The 1955 record of six large loss lumber yard fires causing $2,764,500 total damage compared favorably with the 1954 record of ten fires and $4,000,000 total loss. No lives were lost but 20 persons were injured including 19 firemen.

All six fires occurred while the lumber yards were closed and all fires had made considerable headway before discovery. The absence of watchman protection (and absence of automatic protection where buildings were involved) explains the delayed discovery at four of the yards and also explains how children could enter the yards and set two of the fires without being noticed.

At Hamilton, Ont., July 14, the fire was discovered by outsiders at 7:51 P.M., two hours and 21 minutes before the watchman was to report for duty. At

Wethersfield, Conn., May 20, and at Fort Bragg, Calif., Oct. 30 the watchman was not the first to discover the fire. Substandard watchman protection is likely to be no better than no watchman at all.

In the discussion of 1954 large loss lumber yard fires in the January 1955 QUARTERLY concern was expressed over the fact that eight of the ten fires spread to exposures. A paper presented at the 1955 NFPA Annual Meeting entitled "The Lumber Yard and the Community"** was prompted by this discussion. In 1955, lumber yard fires spread to exposures in two cases and would in all probability have done the same in a third but for the prompt mobilization of strong public fire protection (New York, May 15).

***April 14, San Jose, Calif. Cheim Lumber Co., et al. $469,000†**

Lumber warehouse; hardware store; restaurant. Three adjacent unsprinklered wooden buildings were destroyed by fire that originated in a small shed in which straw and other packing materials were stored. The fire was set by three seven-year-old boys who admitted that they frequently played with matches in the shed.

The fire had spread before a 15 mph wind to the adjacent lumber warehouse before discovery by a passerby at 4:05 P.M. and then jumped a 12-ft-wide driveway to the hardware store housed in a former carbarn. Here the fire was intensified by oxygen and acetylene released from cylinder vents.

Next in line was a 1-story brick, wood-joisted restaurant. Burning through the roof, fire gutted the dining room but was kept from other parts of the building by brick walls.

A well trained and equipped brewery fire brigade protected their seriously exposed plant and thereby relieved fire fighters for other duties.

An asterisk (*) before a listing of a fire indicates fire spread to other buildings.

A dagger (†) after a loss figure indicates that the figure includes an insured business interruption loss.

**Published in the July 1955 NFPA QUARTERLY. Reprints: 25 cents.

***May 15, New York (Queens), N. Y. Jamaica Lumber Co., et al. $720,000**

Lumber yard, poultry processing, construction office, iron railing mfg., doll and toy storage. Lack of protection for this lumber yard during nonoperating periods allowed fire to develop to such proportions in a 10,000 sq. ft. unoccupied shed that the interior and exterior were a mass of flames when firemen responded at 7:19 P.M. Fire was soon spreading through 27,500 sq. ft. of yard-stored lumber and into an unsprinklered 25,750 sq. ft. 1- and 2-story wooden building shared by the lumber company and three other occupants. The building was also destroyed. Fire spread with such speed that on two occasions fire fighters had to abandon hoses.

Heat broke and melted wired glass windows in an exposed wall of a 60,000 sq. ft. 4-story fire-resistive doll and toy storage building. Fires starting on all floors were controlled by 38 sprinklers. Water damage was heavy.

May 20, Wethersfield, Conn. Wethersfield Lumber Co. $268,000

Lumber mill and lumber yard. At 6:45 P.M., while starting his first tour of the night, the watchman saw smoke coming from a dust collector on top of the unsprinklered 2-story brick, wood-joisted mill. However, he was not the first to notice the fire since apparatus arrived as he ran to give the alarm. The fire spread rapidly through the unsprinklered dusty mill and sparks soon started fires in the adjacent lumber yard containing a million board feet of lumber. It appeared that the entire yard would be destroyed, but firemen from Wethersfield and surrounding towns refused to back away and confined damage to about one-third of the lumber in the yard. Had the watchman started his first round on time instead of visiting with a friend he probably would have discovered the fire while it was still small enough to be controlled.

June 14, Hamilton, Ont. C. Lawson & Co. $357,500

12 sheds; 3,000,000 board feet of lumber. At 7:51 P.M., nine minutes before the night watchman was to report for duty and two hours and 21 minutes after the lumber yard had closed for the night, neighbors discovered fire that had been set by children playing in the yard with matches. When firemen arrived flames were jumping from pile to pile of lumber in the overstocked yard and were involving several congested wooden storage sheds.

Oct. 30, Fort Bragg, Calif. Union Lumber Co. $700,000†

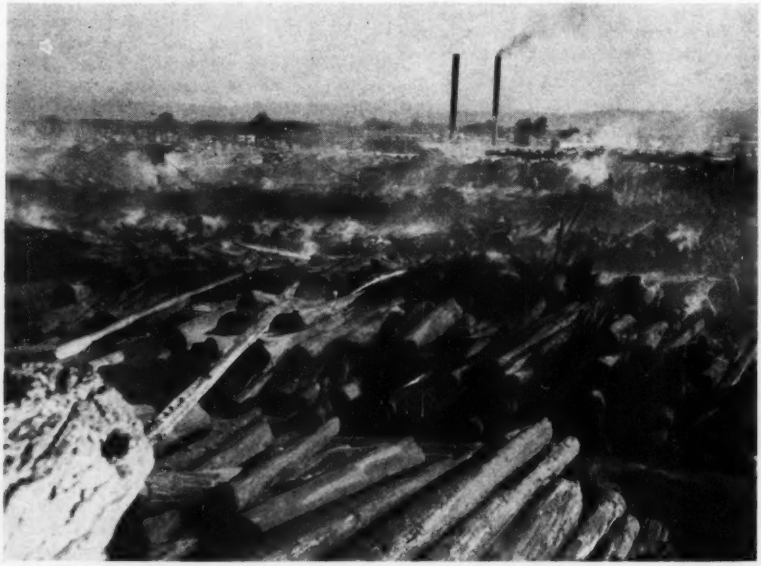
Decked redwood log storage yard for sawmill. Three log piles averaging 400 ft. long, 40 ft. wide and 30 ft. high were totally destroyed and seven similar piles were half destroyed by fire that originated in an accumulation of bark that was being burned 175 ft. north of the log storage yard. Because of steady 35 to 40 mph winds from the north a watchman was stationed in the log storage yard. However, he remained in the southern end of the yard and it remained for another employee to discover the fire in a pile at the north end of the yard at 3:00 P.M. Before the private fire brigade and the public fire department reached the scene, wind-carried flames had spread to two log piles to the south of the pile of origin and log piles on either side were igniting. (Clear spaces 25 ft. wide were maintained between piles.)

The lumber mill had a strong water system for fire protection but because of the commonly held belief that it was difficult to ignite decked redwood logs, the yard hydrant system had not been extended to the log storage area. Fixed elevated nozzles were not provided.

Despite these serious weaknesses in the private fire protection, the private and public fire departments managed to save much of the lumber, primarily because of the effectiveness of two deluge sets supplied by pumpers drafting from the log pond. With no aerial equipment from which to direct the nozzles, the deluge sets were placed on the platforms of lift trucks. Two other deluge sets could not be used due to insufficient hose.

***Dec. 26, New York (Brooklyn), N. Y. Cross, Austin & Ireland Lumber Co. $250,000**

Originating in piles of lumber in the unprotected yard, fire was beyond control when discovered by a passing motorist at 4:35 A.M. Strong winds carried the flames through the piles of lumber and into storage sheds. Because of the threat to other lumber yards and factories, thirty pieces of fire apparatus including two fire boats were used to bring the fire under control.



Hal Ogle

Prior to this fire at Fort Bragg, Calif., it was generally felt that decked redwood logs were difficult to ignite. For this reason the yard hydrant system had not been extended to the log storage area.

Five Largest Church Fires in 1955

When fire destroys a church, the community is stunned, neighboring churches offer temporary facilities, take up collections to swell the rebuilding fund, send sincere messages of sympathy, reinspect their fire insurance policies,—and in isolated instances reinspect their own edifices and correct unsafe conditions responsible for church fire disasters.

The following reports of the five largest church fires of 1955, causing $1,780,500 damage, contain clues to important items that should be included in the reinspection check list. A detailed discussion of church fire prevention and protection is contained in the NFPA publication, "Churches Are Burning."*

Athens Messenger

Fire originated in the unsprinklered basement of this Athens, Ohio, church and spread through spaces around organ pipes to the attic. It was then discovered.

*Forty-two pages; illustrated; single copy price $1.00.

Feb. 5, Athens, Ohio First Methodist Church $405,500

Fire that destroyed this 144 ft. by 90 ft. 2-story brick, wood-joisted church emphasized the fact that fires must be detected and extinguished promptly if damage is to be held to a minimum. In this instance the church was located in a city with good public fire protection and only a half block from a fire station, but because the fire was not discovered promptly destruction was total.

The fire originated in a rear fan room in the basement and was discovered by a policeman at 1:35 A.M., about two hours after a church meeting had broken up. When firemen arrived the fire had spread from the unsprinklered basement through the open spaces around organ pipes and into the concealed space between the roof and auditorium ceiling. The fire department reported that an 8-ft. fan inadvertently left in operation helped to spread the fire up through the building.

March 26, Shreveport, La. Highland Baptist Church $325,000

Following a baptism earlier in the day the baptismal tank had been drained but the gas burner beneath the tank had been left on. The tank overheated and set fire to the baptistery. Fire burned undetected in the 150 ft. by 100 ft. 2-story brick, wood-joisted church until a neighbor heard windows breaking at 10:35 P.M.

July 29, Quincy, Mass. Roman Catholic Archdiocese of Boston $300,000

The auditorium and roof of this high 1-story stone, wood-joisted church were destroyed by fire set by an 11-year-old boy playing with a vigil candle at the confessional near the front entrance. When the curtain of the confessional was ignited, the boy left the church without giving an alarm and the fire burned undetected until seen 10 minutes later at 4:43 P.M. by a passerby (see photo next page).

Despite prompt response by fire fighters the fire had extended to the choir loft above the confessional and was spreading along the combustible fibreboard ceiling of the auditorium when the first engine company arrived. Since

Quincy Patriot Ledger

The details of origin and early development of this Quincy, Mass., church fire are known. An 11-year-old boy playing with a candle accidentally set fire to a confessional curtain from which the fire spread to the combustible fibreboard ceiling of the auditorium.

Wide World

In contrast to the Quincy, Mass., fire pictured at the top of the page, not much is known about the early stages of this fire in Chicago, Ill. Discovery was so delayed that protection of exposures was the principal concern of fire fighters. In this respect the Chicago fire is typical of most church disasters.

heat and smoke prevented inside fire fighting, most effective use of hose streams was delayed until the fire broke through the roof.

Dec. 7, Syracuse, N. Y. St. Vincent de Paul Church $400,000

Substandard wiring in a confessional booth was the determined cause of fire that destroyed this unsprinklered 1- and 2-story brick, wood-joisted church. The fire was first discovered at 12:40 P.M. by a 4-year-old boy.

Although firemen were on the scene within minutes, flames had spread up the freshly painted wall and had entered the concealed space between the ceiling and slate roof before they arrived. Due to the inaccessibility of the concealed roof space the fire burned unchecked above the ceiling until it broke through the roof. Shortly thereafter parts of the roof fell into the auditorium.

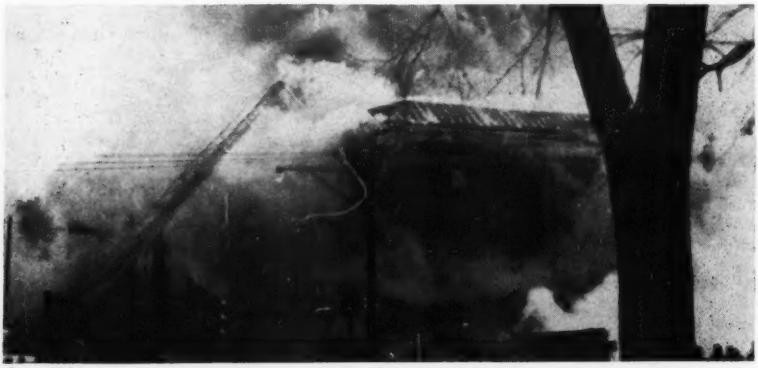
Dec. 25, Chicago, Ill. St. Paul Evangelical Church $400,000

Lack of automatic or watchman protection delayed discovery of fire until it was too late to save the 5-story stone, wood-joisted church, and fire fighters' principal concern was protection of the communicating classroom and gymnasium building and the adjacent 3-story parish house. Burning embers showered the roof of the parish house but were extinguished before igniting the roof. A fire door between the church and gymnasium building held the fire from the gymnasium until fire fighters took over (see photo opposite page).

Wide World

Once fire enters a concealed roof space without sprinkler protection, the results are apt to be about as shown in this photo of the Syracuse, N. Y., fire. Until the fire has broken through the roof, hose streams cannot reach the hidden flames.

Forty-one Other Large Loss Fires in 1955



Press Citizen

The second disastrous fire within 20 years occurred at this unsprinklered athletic club at Iowa City, Jan. 28. Both fires originated in the basement and spread through nonfirestopped walls to the roof.

There were 41 large loss fires in 1955 involving occupancies that did not fall within any of the broad occupancy groupings discussed in separate articles in this issue of the QUARTERLY. These 41 fires were scattered among 19 occupancies, e.g. amusement parks, athletic clubs, bowling alleys, buildings under construction, forest fires, hangars, laundries, office buildings and banks, oil and gas wells, piers. These fires caused $49,319,000 loss, nine deaths and 87 injuries.

Amusement Buildings

***May 3, St. Louis County, Mo. Westlake Park $250,000**

Restaurants, dance hall, thrill rides, etc. Workmen readying this amusement park for its seasonal opening May 8 discovered fire that was coming from the roof of a milk bar. Due to congestion of wooden buildings and a strong wind it was only a matter of minutes before the buildings were doomed.

An asterisk (*) before a listing of a fire indicates fire spread to other buildings.

A dagger (†) after a loss figure indicates that the figure includes an insured business interruption loss.

***June 17, Silver Springs, Fla. Silver Springs Buildings $450,000**

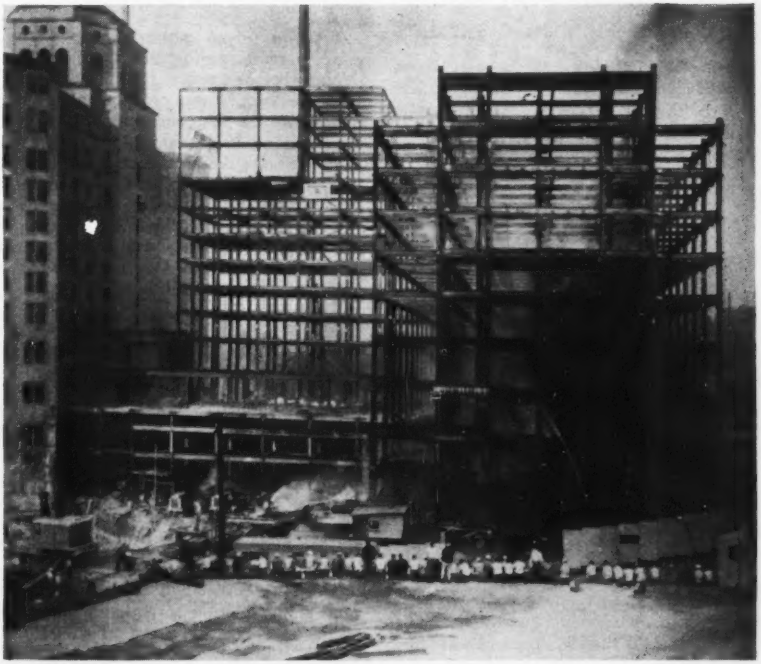
Mineral springs and tropical gardens. A watchman who made unsupervised rounds was the only fire protection provided for this group of buildings located six miles from the nearest organized fire department. Fire originated in the 1-story wooden restaurant sometime during the night and had reached such proportions when discovered by the watchman that he was severely burned trying to get to a telephone. Ocala firemen had already been notified by a passing motorist at 4:30 A.M. The one engine company which responded drafted water from springs, but was unable to check the fire until after it had destroyed five closely grouped combustible buildings.

Athletic Clubs

Jan. 28, Iowa City, Iowa City Recreation Centre, et al. $306,000

Basketball court, work shops, offices, dance floor, club rooms. In 1936 a fire originating in the first story spread through nonfirestopped partitions to the roof of the 11,500 sq. ft. unsprinklered 2- and 3-story brick, steel-framed building. There was considerable similarity between the 1936 fire and the fire that practically destroyed the same building in 1955. The latter fire originated in the un-

The only combustible material in this frozen fruit warehouse under construction near Bradenton, Fla., was approximately 100 tons of asphalt which had been used in applying noncombustible wall and roof insulation (report p. 382).



Wide World

At Pittsburgh, Pa., a $1,200,000 fire occurred June 28 at a hospital building under construction. Originating in straw and lumber at the first story level the fire spread rapidly to planking and forms at upper levels before firemen arrived (report, p. 382).

sprinklered basement and was spreading through nonfirestopped walls to the attic and roof when firemen arrived. The 1936 fire was beyond control when discovered by a passerby, whereas the 1955 fire, although discovered by occupants, spread beyond control before firemen reached the scene because occupants fought the fire with first aid equipment before giving the alarm.

Dec. 30, Haverhill, Mass. Y.M.C.A. $270,000

Two-thirds of this 16,200 sq. ft. 4-story brick, wood-joisted building was destroyed by fire that originated in a 3-ft.-deep space between the second story ceiling and the third story floor. A defective ventilating system blower motor mounted in this space was the reported cause. The undivided concealed ceiling space was totally involved and flames were spreading through ventilating ducts when firemen arrived.

Bowling Alleys

Feb. 9, Ocean City, N. J. Playland $252,500

Bowling alley, skating rink, carousel, shooting gallery, various other amusements. The interior of this 87,500 sq. ft. 1-story combustible building (wood walls and framing, combustible fibreboard interior finish) was in flames when fire was discovered by police at 2:45 A.M. Flames were through the roof when apparatus arrived. An off-shore wind carried embers to the water and probably prevented a conflagration.

March 6, New York (Brooklyn), N. Y. State Bowling Center, et al. $429,500

Bowling alleys; two clothing stores. Careless smoking was the probable cause of fire that originated in the second story bowling alley premises of this unsprinklered 3-story brick, steel-framed building. The fire was beyond control when discovered by a passerby at 6:55 A.M. and destroyed the upper two stories and roof. Clothing stores on the first floor suffered severe smoke and water damage.

Buildings Under Construction**

June 15, near Bradenton, Fla. Fruit Industries, Inc. $273,000

Frozen fruit juice warehouse under construction. Work had just about been completed on this unsprinklered warehouse when fire that broke out on recently applied insulation practically destroyed the 50,600 sq. ft., 25-ft.-high undivided 1-story building. Walls were reinforced concrete frame with hollow concrete block enclosures. The roof consisted of 18-gage metal pan on unprotected steel channel beams supported entirely by pipe columns. The interior surfaces of the walls and the top side of the roof were heavily insulated with layers of glass fibre blocks attached with hot asphalt. Approximately 100 tons of asphalt were used in applying the wall and roof insulation (see photo, page 381).

At 4:00 P.M. June 14, the last of the interior insulation was applied. At 6:00 A.M. the following morning, the construction foreman discovered a flickering flame on wall insulation about 15 feet above floor level at the location where the last insulation was applied the previous day. Fire department notification was delayed until workmen emptied a cask of water on the flames from a scaffold and then got a water-type extinguisher from another building. It is claimed that the extinguisher could not be operated.

The fire spread rapidly over the asphalt-coated interior during the approximately 15 minutes before firemen from Bradenton were summoned and flames were issuing from the roof when the first engine company arrived. Heat and smoke prevented firemen from entering through the only doorway in the otherwise blank exterior walls and hose streams had little effect until the roof collapsed. Firemen were able to prevent fire from spreading over the nonparapeted party wall to an adjoining warehouse of similar construction loaded with frozen juice concentrate.

Application of overheated asphalt may have caused the fire. No temperature controls were provided on the asphalt heaters.

June 28, Pittsburgh, Pa. University of Pittsburgh School of Health Professions $1,200,000

The structural steel for this 14-story fire-resistive hospital had been erected, the third floor had been poured, and considerable temporary plank flooring and plywood forms had been installed throughout the structure prior to the outbreak of this fire sometime before 6:00 A.M. Ignition of loose and baled straw at the first story level by smoking material carelessly discarded from a window of a hospital eight feet away was the probable cause.

**See also the meat packing plant fire at Prince Albert, Sask., p. 297 and the school at Longueuil, Que., p. 364.

Although a watchman was on duty he did not notice the fire until 6:30 A.M., at about the time several outsiders also saw the flames.

The fire spread readily through the straw and lumber in the first story and to planking and forms at upper levels, and firemen were confronted with a fire burning at all levels when they arrived. Sixteen 2½-in. and nine 1½-in. hoses were used for about two hours to bring the fire under control. Because of the difficulty in getting water on the fire at upper levels, private hose streams were directed at the flames from upper story windows of the adjacent hospital. Concrete in lower stories and structural steel throughout the building were extensively damaged.

The fire did not enter the adjacent hospital but as a precaution all 225 patients were moved to an adjoining hospital (photo p. 381).

Oct. 13, Halifax, N. S. Kenney Construction Co. $750,000

Building under construction. This 6-story fire-resistive building was nearing completion but had not as yet been turned over to the Canadian Navy for use by the Maritime Warfare Training School when it was heavily damaged by fire.

Origin appeared to be in a walled-off pump room at the base of the 12 ft. square main service shaft through which plumbing, heating and ventilating ducts and contractor's temporary wiring extended to all stories. Short circuit of temporary wiring in the pump room was the probable cause. Among substandard features of the wiring system were the use of wires of different gages in the same circuit and attachment of wires to metalwork with metal wire.

The fire apparently entered the shaft from the pump room by burning cork insulation on pipes that went through the intervening masonry wall. The fire burned an estimated 30 minutes before two employees working late to finish a job in the sixth story smelled smoke at 7:21 P.M. Flames were then spreading up the shaft feeding on cork insulation and mastic joint sealing compound on the outside of air conditioning ducts and pipes and were entering concealed ceiling spaces at upper floor levels through service openings that had not as yet been properly closed.

Unfamiliarity of fire fighters with the layout of the building, dense smoke, large windowless areas and lack of roof vents made fire control extremely difficult. The fire was brought under control in two hours with 10 hose streams.

Car Barn

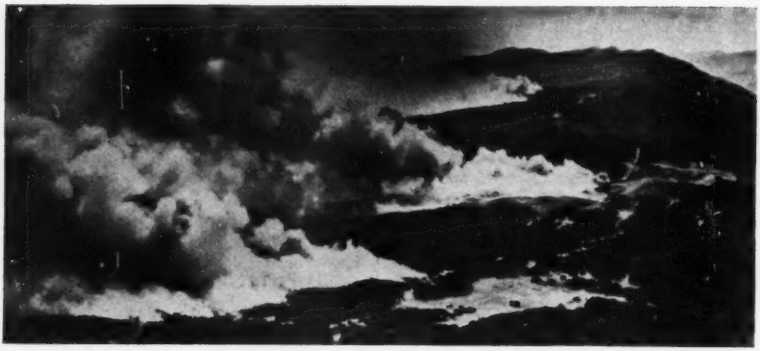
May 18, Pittsburgh, Pa. Pittsburgh Railways Co. $500,000

Street car barn; 19 street cars. This old car barn, constructed of brick walls and unprotected steel roof framing, was destroyed along with six of the 19 street cars stored inside. The other 13 cars were damaged. Had the sprinkler system which formerly protected this building been kept in service it is probable that the loss would have been confined to the old wooden work car in which it started. The sprinkler protection had been discontinued several years ago.

The car dispatcher discovered the fire in the old car at 6:00 P.M. Employees did not immediately attack the fire with first aid equipment and by the time public fire apparatus arrived the fire had extended to the wood roof deck of the building. With no firewalls or draft curtains in the building the fire spread beneath the roof causing burning debris to fall and ignite the cars, a few of which had combustible roofs and all of which had combustible interiors.

Pittsburgh Press

The sprinkler system that formerly protected this Pittsburgh, Pa., car barn had not been kept in operating condition during recent years.



Wide World

Eleven forest fires in 1955 destroyed an estimated $29,595,500 in natural resources. Pictured here is the fire that started Sept. 6 in the Los Padres National Forest, Refugio, Calif.

Forest Fires

March 7, Madison and Taylor Counties, Fla. State of Florida $456,000

57,000 acres. Two large fires, set by arsonists four days apart, joined into one large fire that destroyed 57,000 acres of timberland.

March 23, Green Swamp, N. C., State of North Carolina $965,000

117,000 acres. Fire believed set burned 117,000 acres of evergreen swamp brush, pond pine, swamp hardwoods and long-leaf pine located in Columbus and Brunswick Counties.

March 30, Lake Philips, N. C. State of North Carolina $1,279,000

175,000 acres. This fire, like the Green Swamp fire of March 23, was set and burned similar ground cover in Washington, Tyrrell and Hyde Counties.

April 20, near New Bern, N. C. Croatan National Forest $271,000

72,600 acres. Fire of undetermined cause burned 72,600 acres of woods and swamp.

June 30, near Ste. Marguerite, Que. Quebec North Shore Paper Co., et. al. $500,000

60 sq. miles brush, scrub pine, balsam, cut plywood, wood camps; 5 dwellings; church. Lightning started several fires that spread before shifting winds through the dry forest for several days. Firemen, consisting primarily of lumbermen, saved most of the small town of Ste. Marguerite and kept the fire from entering Clarke City.

Aug. 14, West Fork, Calif. Angeles National Forest $412,000

792 acres. Children playing with matches started this fire that destroyed 792 acres of watershed. Cost of suppression was $106,000.

Sept. 2, McGee, Calif. Sequoia National Forest $1,048,500

17,580 acres. A controlled fire to remove agricultural waste spread to 17,580 acres of timberland. Cost of suppression was $600,000.

Sept. 4, Haystack, Calif. Klamath National Forest $19,842,000

64,518 acres. Lightning started fire that burned 64,518 acres of timberland. Cost of suppression was $550,500.

Sept. 6, Refugio, Calif. Los Padres National Forest $3,926,000

84,770 acres. Fire originating in a building spread to and burned 84,770 acres of watershed. Cost of suppression was $463,000.

Sept. 6, Thompson Peak, Calif. Shasta-Trinity National Forest $230,500; 1 killed

3,320 acres. One fire fighter was killed by a falling snag while working to control this fire that burned 3,320 acres of timberland. Lightning was the cause. Cost of suppression was $278,000.

Sept. 7, Six Mile, Calif. Klamath National Forest $565,500

5,283 acres. Lightning started the fire that burned 5,283 acres of timberland. Cost of suppression was $244,000.

Hangars

March 22, near Malton, Ont. Avro Aircraft Ltd., et al. $3,402,000

Hangar used for manufacturing purposes; five aircraft. Clear evidence is available that an electrical short circuit in a galvanized steel conduit leading into a service fuse disconnect switch was a source of a fire which destroyed a 36,386 sq. ft. unsprinklered wood framed-hangar and three aircraft, all ground equipment, records and stores, and damaged one other aircraft. Winds of 39 mph with gusts of 57 mph and the combustible construction of the hangar were major factors in the rapid spread of flame throughout the structure.

The hangar watchman was alerted to the fire by a loud crack and sputtering sound emanating from the electrical panel box and conduit pipe. The hangar was divided into two sections by an asbestos partition which restrained for a few minutes the spread of fire and permitted the safe removal of one aircraft and the removal of a section of another aircraft which, however, received some fire damage due to a collision with equipment on the ramp during the manhandling.

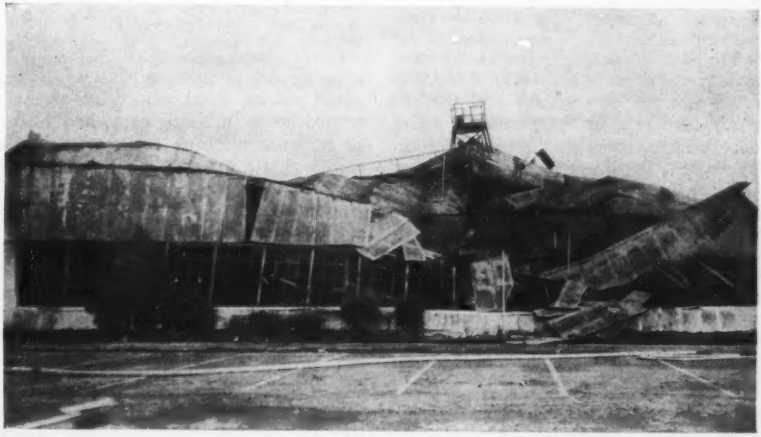
Fire department response included the plant fire brigade and mutual aid from nearby towns. Hangars on either side of the building of origin were saved by the combined efforts of the fire departments assisted by a favorable shift in wind direction. A car parked 100 ft. from the fire and in the path of the wind was burned out.

Dec. 29, South San Francisco, Calif. Southwest Airways $1,150,000

Engine and general overhaul hangar. Starting in the center of the overhaul shop near a work bench, flames went undetected for 15 to 30 minutes before mechanics on the "graveyard" crew, working in other parts of the hangar, discovered the fire at 11:56 P.M. The 150 ft. by 162 ft. part wood and part unprotected steel unsprinklered structure was divided into several sections by partitions but none qualified as a fire wall.

The flames first burned through a plywood ceiling in the overhaul shop, spread over a metal division wall which did not extend to the gabled roof, and communicated to a twin engine Martin 202. The cleaning, welding and office sections were also quickly involved despite initial efforts of employees to use available hand extinguishers. Once the aircraft became involved, a very hot fire developed and after oxygen cylinders exploded and magnesium parts ignited, little could be done to save the hangar.

An "empty" aircraft fuel tank in an alleyway behind the hangar exploded during the fire causing flames to extend to an adjacent 10 ft. by 50 ft. radio shop.



At South San Francisco fire originated in the overhaul shop of an unsprinklered hangar. After spreading over the top of a metal division wall that did not extend to the roof, flames involved a twin engine Martin 202 parked in another part of the hangar.

United Press

Historic Wayside Inn, Sudbury, Mass. and its valuable collection of New England antiquities were practically destroyed by fire believed caused by an overheated unlined chimney in the first story. Sprinklers were installed in the attic only.

Historic Building

Dec. 22, Sudbury, Mass. Wayside Inn. $250,000

Historic inn and restaurant. Decision to limit sprinkler protection to the attic because it was thought that a complete system would have spoiled the looks of the 318-year-old building is considered by many to be responsible for the destruction of the building and its valuable collection of New England antiquities. An overheated unlined chimney was the reported cause of the fire that originated in a first story partition where it developed for some time before detection by the watchman on one of his hourly tours at 2:25 A.M. Flames spread through nonfirestopped walls, and on breaking into the open spread up open stairways. Investigators agree that sprinklers would have had no effect on the fire in the walls but point out that sprinklers would have prevented fire from spreading through rooms and up stairways, and would thereby have permitted firemen to enter the building to get at the concealed fire within walls.

When the fire reached the attic the ten sprinklers operated but were overpowered by the intense fire burning in lower stories.

Fire departments from several towns responded but were severely handicapped by lack of a good water supply. There was no public water system and a mill pond across the road was covered by 19 inches of ice.

Laundries

***Nov. 15, Los Angeles, Calif. City Dye Works, et al. $280,000**

Carpet cleaning; cardboard box mfg. Two adjoining 2-story buildings (first stories brick, second stories wood, stuccoclad) were destroyed by fire that originated in a 20 ft. by 30 ft. wooden carpet drying room on the 11,175 sq. ft. first floor of the carpet cleaning building. The fire was discovered by an outsider at 3:45 A.M., 2 hours and 45 minutes after a crew had repaired a gas-fired forced draft suspended heating unit which was used to heat the drying room during the night. After the crew left, the controlling thermostat failed, allowing the combustible drying room to overheat and ignite.

The building was unsprinklered and despite the fact that the heater was known to have been giving trouble no watchman was left on the premises. Fire had extended through a hoistway to the second story, had broken through the roof and had ignited the adjoining 12,000 sq. ft. box factory before firemen arrived.

Dec. 27, near Topeka, Kan. Topeka State Hospital $364,500

Hospital laundry. Irregular and unsupervised watchman protection, lint accumulations and absence of sprinklers appeared to be the three principal fire protection weaknesses which in combination caused the destruction of this large 1-story brick, wood-joisted building and $124,000 worth of recently installed laundry equipment.

Investigators think that lint was ignited by the motor on a water cooler located about in the center of the building. From here the fire spread in all directions over lint-covered surfaces and had involved the entire interior when seen by a passerby at 12:27 A.M.

Motion Picture Theatre

April 5, Babylon, N. Y. Prudential Theatre Corp. $250,000

Motion picture theatre, luncheonette, office. At 11:38 P.M., April 4, cleaning women discovered fire on the stage. Ignition of the combustible stage curtain by short circuit of the curtain raising motor was the reported cause. Firemen confined damage to the stage and, believing the fire out, returned to quarters in about thirty minutes. At 12:46 A.M. they were again called to the theatre to find that fire on the stage had spread to the combustible fibreboard ceiling of the auditorium and had involved the entire theatre. There were no stage vents. This time the fire destroyed the unsprinklered 200 ft. by 50 ft. 3-story brick, steel-framed building before being controlled.

Night Club

July 11, San Francisco, Calif. Italian Village Night Club, et al. $250,000†

Night club; hotel. The basement and the first story of this 3-story brick, wood-joisted building were badly damaged by a suspicious fire that was discovered in the basement of the night club by the night janitor at 3:43 A.M., a few minutes after he had checked the basement and found everything in order. He ran upstairs to tell the night club manager who slept in the hotel occupying the two upper stories. The manager telephoned the fire department, after which he and the janitor ran through the corridors rousing guests.

The fire started in an unsprinklered area of the basement adjacent to sprinklered dressing rooms, the only part of the building so protected. Windowless basement walls prevented access to the fire until it had burned first story supports and dropped part of the first story into the basement.

Aided by a stairway enclosure, fire fighters were able to keep the fire within the first story and basement. In the meantime, the rescue squad had removed all hotel guests to safety.

Office Buildings and Banks

Jan. 21, Casper, Wyo. Casper National Bank $334,000

Bank. An explosion in the overloaded incinerator that strewed burning pieces of paper about the basement incinerator room was the reported cause of fire that destroyed the old 100 ft. by 25 ft. 2-story brick, wood-joisted section of the bank and burned out the interior of the adjoining and communicating 100 ft. by 75 ft. high 1-story reinforced concrete section. On smelling smoke the janitor went to the basement and fought the fire with carbon dioxide extinguishers for 40 minutes before smoke forced him out (see photo p. 388).

Just outside the incinerator room and throughout the unsprinklered basement, old records and bank supplies were piled to the ceiling. Aisles were so narrow that just one person could pass at a time. Fire had spread to these records by the time firemen arrived. Because of the dense smoke the basement could not be entered and fire was able to burn through flooring and spread up through the old wood-joisted section. Unprotected openings allowed fire to spread to the reinforced concrete sections where combustible interior finish including ceiling and wall paneling contributed fuel for the fire.

Contents of vaults were damaged by water but were not burned or charred.

Dec. 26, Lowell, Mass. Medical Arts Building $400,000

Seven stores, 20 offices, one apartment. A mentally deranged man who was "mad at the world" admitted setting fire that destroyed this unsprinklered 4-story brick, wood-joisted building. The fire was set at the rear door of a paint and wallpaper shop and spread to wooden shelving loaded with gallon cans of paint, inside the door. Shortly after discovery by police at 2:36 A.M. the shelving collapsed, cans fell to the floor

Ken Photo Shop

An explosion in an overloaded incinerator strewed burning pieces of paper about the basement incinerator room at the Casper, Wyo. National Bank. Thus was started a fire that did $334,000 damage because of several glaring fire protection weaknesses.

At Lowell, Mass., 20 offices were destroyed by fire that got its momentum in a paint store in the first story.

and ruptured, and the fire spread rapidly out of control in the paint store and spread to the other first story stores and to upper stories through concealed ceiling spaces, nonfirestopped walls, open stairways, and other openings in the undivided 6,500 sq. ft. building.

Careful investigation of the ruins by fire department officials indicated that the fire had been set and led to apprehension of the arsonist by police.

Officers Club

Jan. 21, Andrews Air Force Base, Md. United States Government $275,000

Air Force officers club and mess. When discovered at 2:20 A.M. by a passerby fire had completely involved the interior and was coming through the roof of this 32,000 sq. ft. masonry, wood-joisted building. The building had been closed since noon of the preceding day and had been without the protection of sprinklers, an automatic fire detection system or a watchman.

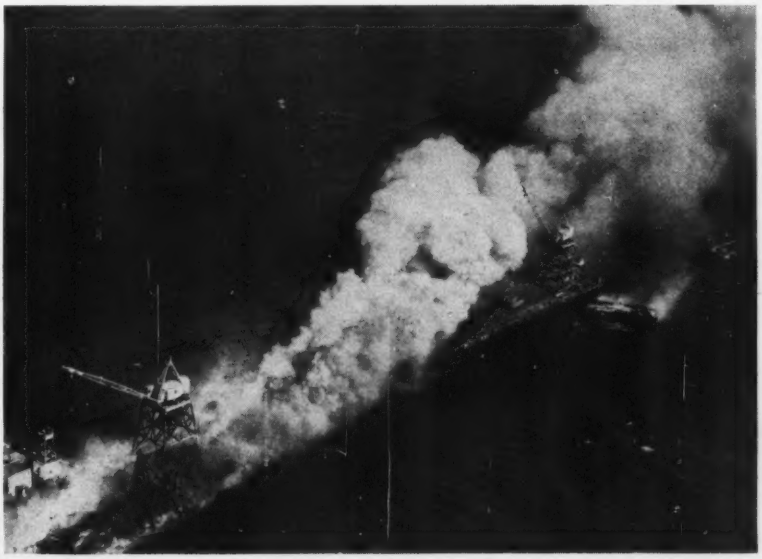
Oil and Gas Wells

March 2, near Silver, Texas Stanolind Oil Co. $1,000,000; 2 killed

Oil well. Two men suffered fatal burns and ten were less seriously injured by a flash fire that broke out while 20,000 gallons of "san-frac" oil were being injected under pressure into the well. The flash fire occurred at 7:30 A.M. when a 2-inch pipe 30 ft. from the well ruptured and sprayed the area with oil. Several ignition sources were present including pumps, truck motors, and hot exhausts. The fire burned out of control until 4:30 P.M. when an oil well fire fighting expert from Houston entered the fire area under the protection of a metal shield and water spray, and put out the fire by closing a valve.

April 12, near Fort St. John, B. C. Texaco Exploration & Associates $304,500

Gas well. While the drilling rig was in operation a blow-out occurred and escaping gas ignited. The fire destroyed all drilling equipment and burned until subdued by oil well fire specialists five days later.



Wide World

Concrete fire walls beneath the deck at about 300 ft. intervals were a major factor in controlling the substructure fire on a 300 ft. section of this unsprinklered wooden pier at Newark, N. J. (see report, page 390).

Piers

April 1, San Francisco, Calif. San Francisco Ferry Building $250,000

Pier superstructure. A spark from an acetylene torch that had been used earlier in the day by a contractor's crew doing reconstruction work was put forth as the probable cause of fire that destroyed most of the 100,000 sq. ft. unsprinklered and undivided pier building between two slips. A concrete pier deck prevented fire from involving the substructure.

The fire was discovered by a maintenance employee, three quarters of an hour after the workmen had gone home. High winds had carried the fire through much of the building before fire fighters arrived. The fire emphasized the need for more than one fire boat. The one boat available did good work but necessary shuttling from one side of the pier to the other to check the fire reduced the boat's effectiveness.

April 8, Newark, N. J. Port of New York Authority, et al. $550,000

1,500-ft. pier; 4 barges. About 450 ft. of the 1,500-ft.-long wooden pier was destroyed by fire that broke out while a pier repair crew was driving piles from a barge moored to the pier. The fire is believed to have originated in the barge from where it spread to the wooden pier deck and to the unsprinklered substructure. Efforts of the pier repair crew to fight the fire with a standpipe hose on the pier were abandoned when it was discovered that the water was turned off.

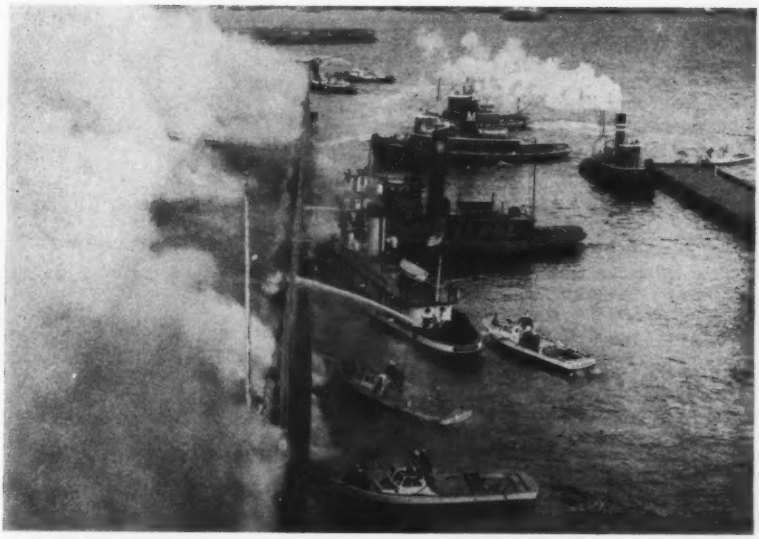
The fire alarm was given promptly, but flames spread before a shifting wind, first in one direction then in another, making attack by land companies stationed on the pier hazardous. At one time a quick change in direction of the wind forced firemen to run for safety, abandoning 500 ft. of hose and a hose truck. Concrete fire walls beneath the deck at about 300-ft. intervals confined the substructure fire to a 300-ft. section. Eight fire boats played a major part in bringing the fire under control (see photo p. 389).

June 17, Charleston, S. C. Tidewater Terminals, Inc. $3,000,000; 2 killed

Three piers and pier sheds loaded with newsprint, sugar, canned goods and insecticides. Three unsprinklered wooden piers and their wood-frame metalclad pier sheds and steel-framed, metalclad bulkhead buildings were destroyed by fire that originated at the river end of one of the piers where a sugar boat was being unloaded.

Charleston Evening Post

Lack of fire walls and sprinklers in the pier substructure and in the pier shed were among the serious fire protection weaknesses responsible for the Charleston, S. C. fire that took two lives and did $3,000,000 damage.



United Press

Three of the four large loss pier fires spread through undivided and unsprinklered pier substructures. At the Jersey City fire shown in the photo early attempts to control the substructure fire by land companies were handicapped by lack of any firewalls or bulkheads in the substructure, and no pier deck openings to provide access for fire fighting.

When first seen the fire was coming up between deck planking. Reports indicate that employees fought the fire with buckets of water and later with standpipe hoses for more than ten minutes before the fire department was notified. During this time the fire developed rapidly and when the first apparatus arrived at 11:55 A.M., the undivided substructure and undivided shed on the pier of origin were totally involved. Two men who entered an office in the bulkhead building to remove papers at the time the first fire apparatus arrived were trapped by the rapid spreading fire and lost their lives.

The strong winds that drove the fire rapidly shoreward also carried heat and smoke into the faces of land fire companies and made an effective stand practically impossible. As flames spread to the communicating piers and bulkhead buildings (the three piers and their bulkhead buildings constituted an undivided fire area of 150,000 sq. ft.) firemen concentrated on preventing a major conflagration. Flaming debris carried inland by the wind set several fires but all were controlled promptly by the combined action of the Charleston fire department and fire departments dispatched to the scene by surrounding towns and military installations. An Air Force helicopter in radio communication with a mobile dispatcher at the scene was an aid in spotting roof fires.

Sept. 14, Jersey City, N. J. City of Jersey City, et al. $1,250,000

Pier, freighter, two barges. Lack of sprinklers and fire walls in the substructure allowed fire originating beneath the pier deck to destroy this 645 ft. by 148 ft. wooden pier and its practically empty, unsprinklered 1-story steel-framed, metalclad superstructure. Two barges moored to the pier were damaged, and a freighter was pulled into midstream where a small fire aboard was quickly extinguished.

Responding to a pier employee's alarm at 3:22 P.M., firemen drove their apparatus into the pier shed, dropped suction lines over the side and, since there were no openings in the deck (concrete on wood), directed hose streams supplied by pumpers and pier standpipes at the substructure fire from barges moored alongside. The fire spread so rapidly beneath the deck, however, that the pier soon had to be evacuated and from then on firefighting was a matter of protecting exposures.

Ship

Nov. 13, off Delaware United States Government $250,000; 4 killed

Radar picket ship. Four men lost their lives and the engine room of this converted Liberty Ship (8,000 ton displacement, 416 ft. long, 57 ft. beam) was severely damaged by fire that originated at the fuel oil centrifuge on top of the fuel oil tank for a diesel-powered alternating current generator. Since radar equipment required alternating current (the ship service was direct current) alternating current generating equipment including the generator, fuel oil storage tank, settling tank, and oil centrifuge had been installed in the engine room.

Heat from the fire at the centrifuge melted or cracked valves thereby releasing fuel oil that created an intense fire in the engine room and engine room bilges. The ship's power was knocked out, including power to operate fire pumps. Fire control could not be attempted until other vessels came to the rescue.

Stable

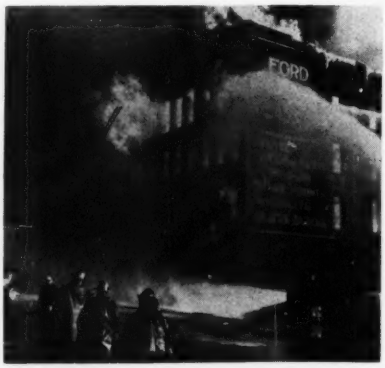
Nov. 18, Livonia, Mich. Northville Riding Academy $271,000

Horse stable, riding ring, dwelling. Originating in the haymow fire made headway before discovery due to lack of automatic protection. Once discovered, a further delay in fire department response resulted when it was found that telephone wires had burned. With fire raging overhead, employees did a remarkable job removing 65 of the 70 horses and then restraining them from running back in. When fire fighters arrived most of the undivided 21,000 sq. ft. 1-, 2- and 3-story wooden building was in flames.

Tunnel

June 30, near Alderpoint, Calif. Northwestern Pacific R.R. Co. $250,000

Railroad tunnel. The 452-ft.-long timber-lined tunnel was burned out by fire that had spread throughout the tunnel before discovery by a train engineer. A state forestry official suggested that the timbers might have been ignited by hot carbon blown from the exhaust of a diesel locomotive. He attributed several fires along the right-of-way to this cause.



United Press

Vacant building destroyed, nine exposures damaged at Minneapolis.

Vacant Building

***May 6, Minneapolis, Minn. Ford-McNutt Glass Co., et al. $961,500†**

Unoccupied building destroyed; nine exposures damaged. Fire originating in the rear of the first story of a recently vacated 4-story brick, wood-joisted warehouse was beyond control in the first story before discovery by the operator of a neighboring parking lot at 4:49 P.M. The building was supposedly protected by a sprinkler system, and a caretaker was at work in the second story. For some undetermined reason the sprinklers had been turned off and the caretaker first learned of the fire when fire apparatus pulled up at the door.

Fire spread up through the undivided building and extended over a 22-ft.-high blank wall to the wooden roof of an adjoining sprinklered 6-story building. Wind-whipped flames were also carried around the fire wall and ignited wooden window frames on the front of the 6-story building. Sprinklers held the fire in check at windows, but the wooden roof of the otherwise fire-resistive building was severely damaged.

Heat and embers carried by high winds ignited a noncombustible clothing warehouse and cars in a parking lot across an 80-ft.-wide street from the building of origin. About 70 other fires were started by wind-carried embers, one about a mile away, but only eight caused appreciable damage. But for the exceptional work by the Minneapolis Fire Department a conflagration might well have developed.

Summary of Large Loss Aircraft Fires

Sixty-nine large loss aircraft fire accidents occurred in North America in 1955 according to NFPA records. These accidents cost 254 lives and represented approximately $82,130,000 in losses, including the value of the aircraft and other property destroyed. The individual stories of these accidents are published in NFPA Aviation Bulletin No. 142.*

The accidents reported in AB No. 142 involved 55 military aircraft, 11 commercial or private aircraft and 3 manufacturers test aircraft. Of the military, 44 of them were U. S. Air Force aircraft, 6 were U. S. Naval aircraft, 2 were U. S. Marine Corps aircraft, 2 were an Air National Guard planes and 1 a Royal Canadian Air Force aircraft. Of the commercial and private aircraft, 7 were airline aircraft and 4 were executive or business aircraft.

Forty-three of these aircraft fire accidents occurred after ground impact, 22 originated as fires in flight, 3 were helicopter crash fires and the exact cause of one accident could not be established.

As to location of these accidents, 52 per cent (36 incidents) occurred off airports and 40 per cent (28 incidents) happened on airports or on helicopter landing areas. The balance of the aircraft accidents occurred in the water.

This year's record has many interesting case histories. Only by studying each can a full appreciation of their significance be achieved (see NFPA Aviation Bulletin No. 142). Foam was used in attempting rescue and fire control in 31 cases and carbon dioxide in 13 cases. In some instances, the two agents were used simultaneously as recommended in the NFPA's Suggested Aircraft Rescue and Fire Fighting Equipment standard. The crash fire fighting attacks were considered most effective in 14 cases, and inadequate in 8 of the tragedies. Structures were involved in 11 of the accidents.

Seven of the accidents involved commercial airline aircraft in the United States during 1955. These 7 accidents caused an estimated $5,860,000 damage with the loss of 104 lives.

*Available from the NFPA Executive Office for $2.00 a copy.

Large Loss Aircraft Fires of 1955

Date	Place	Operator	Type a/c	Est. Loss	No. Killed
Jan. 22	near Dakota City, Iowa	U.S. Air Force	F86D	$ 700,000	.....
Feb. 8	near Beallsville, Md.	U.S. Air Force	B-57	$1,000,000	1 killed
Feb. 8	North Apple Valley, Calif.	U.S. Air Force	B-57B	$1,000,000	2 killed
Feb. 8	Fort Worth, Tex.	U.S. Air Force	B-36D	$3,500,000	2 killed
Feb. 12	La Ronge, Sask.	U.S. Air Force	B-47	$2,500,000	1 killed
Feb. 15	Port Columbus, Ohio	U.S. Navy	F9F-6	$ 500,000	.....
Feb. 23	near Sedalia Air Force Base, Mo.	U.S. Air Force	KC-97	$2,000,000	9 killed
Feb. 26	Ava, N. Y.	U.S. Air Force	T-33	$ 500,000	2 killed
Feb. 28	Lake Charles, La.	U.S. Air Force	B-47E	$2,825,000	5 killed
Mar. 3	Long Beach, Calif.	Fleetway Corp.	PBY-5A	$ 250,000	2 killed
Mar. 3	Hagerstown, Md.	U.S. Air Force	C-119	$ 260,000	.....
Mar. 6	Loring Air Force Base, Me.	U.S. Air Force	B-36	$3,500,000	.....
Mar. 9	Bel Air Beach, Fla.	U.S. Air Force	F-86D	$ 750,000	.....
Mar. 16	near North, S. C.	U.S. Air Force	B-47	$2,500,000	.....
Mar. 25	El Paso, Tex.	U.S. Air Force	RB-47	$2,550,000	3 killed
Mar. 28	Sioux City, Ia.	U.S. Air Force	F-86D	$ 700,000	1 killed
Mar. 29	Greenville Air Force Base, Miss.	U.S. Air Force	T-33 and C-46	$ 250,000	1 killed

Date	Place	Operator	Type a/c	Est. Loss	No. Killed
Apr. 4	near Sayville, N. Y.	United Air Lines	DC-6	$1,500,000	3 killed
Apr. 5	East Boston, Mass.	Massachusetts Air National Guard	F-94B	$ 250,000	.....
Apr. 6	Hurst, Tex.	Bell Aircraft	HSL-1	$ 250,000	1 killed
Apr. 15	near Kindley Air Force Base, Bermuda	U.S. Air Force	B-47	$2,500,000	3 killed
Apr. 15	Sydney, N. S.	U.S. Marine Corps	C-119	$ 260,000	1 killed
Apr. 29	Frobisher Bay, Newfoundland	U.S. Air Force	C-124	$1,500,000	.....
May 4	Over Atlantic Ocean	U.S. Air Force	KC-97G	$2,000,000	9 killed
May 5	Stewart Air Force Base, N.Y.	U.S. Air Force	F-86D	$ 700,000	1 killed
May 24	Williston, Vt.	U.S. Air Force	F-89	$ 500,000	.....
May 25	near San Angelo, Tex.	U.S. Air Force	B-36J	$3,500,000	15 killed
May 31	Barksdale A.F. Base, La.	U.S. Air Force	B-47	$2,500,000	4 killed
June 20	Portland International Airport, Portland, Ore.	U.S. Air Force	2 F-89D's (Partial)	$ 738,000	.....
June 28	East Boston, Mass.	Mass. Air National Guard	F-94B	$ 250,000	.....
July 12	Baltimore, Md.	U.S. Air Force	B-57	$1,000,000	2 killed
July 13	New York, N. Y.	Port of N. Y. Authority	Bell 47-G	$ 250,000	2 killed
July 13	near Castle A.F. Base, Calif.	U.S. Air Force	KC-97G	$1,500,000	10 killed
July 14	near Lucas, La.	U.S. Air Force	B-47	$2,500,000	4 killed
July 17	Chicago, Ill.	Braniff Airways	Convair	$ 750,000	22 killed
July 23	Worcester, Mass.	U.S. Air Force	F-86F	$ 700,000	.....
July 26	Corpus Christi Bay, Tex.	U.S. Navy	PBM	$ 250,000	4 killed
Aug. 4	Fort Leonard Wood, Mo.	Amer. Airlines	Convair	$ 750,000	30 killed
Aug. 8	near Edwards Air Force Base, Calif.	U.S. Air Force	X-1A	$1,000,000	.....
Aug. 12	Albany, Ga.	U.S. Air Force	F-84F	$ 500,000	1 killed
Aug. 14	Otis Air Force Base, Mass.	U.S. Air Force	B-57B	$1,000,000	2 killed
Aug. 23	Charleston, S. C.	U.S. Air Force	C-119	$ 300,000	9 killed
Aug. 29	East Palo Alto, Calif.	Hiller Helicopter Co.	Experimental	Over $1,000,000	.....
Sept. 6	near Alexandria, La.	U.S. Air Force	C-119	$ 260,000	4 killed
Sept. 6	Kirtland A.F. Base, N. M.	U.S. Air Force	C-124	$2,500,000	1 killed
Sept. 7	McCarran Field, Nev.	U.S. Air Force	B-25 and F-86	$ 250,000	5 killed
Sept. 7	Stewart Air Force Base, N.Y.	U.S. Air Force	T-33	$ 500,000	2 killed
Sept. 8	Burbank, Calif.	Currey Air Transport	DC-3	$ 700,000	4 killed
Sept. 8	Cold Lake, Alta.	Royal Canadian Air Force	CF-100	$ 500,000	2 killed
Sept. 20	Dow Air Force Base, Me.	U.S. Air Force	KC-97	$2,000,000	.....
Oct. 3	near Union City, Okla.	Great Lakes Carbon Corp.	A-26	$ 250,000	4 killed
Oct. 14	Atlanta Naval Air Sta., Ga.	U.S. Air Force	B-47	$2,500,000	.....
Oct. 14	Yerba Buena Island, Calif.	U.S. Navy	AD	$ 250,000	1 killed
Oct. 20	near Hagerstown, Md.	Fokker	S-14	$ 500,000	1 killed
Oct. 31	Corpus Christi, Tex.	Glasscock Drilling Co.	Bell 47-G	$ 250,000	3 killed
Nov. 2	East Meadow, N. Y.	U.S. Air Force	B-26	$ 250,000	2 killed
Nov. 6	McGuire A.F. Base, N. J.	U.S. Air Force	F-86A	$ 700,000	1 killed
Nov. 8	near Marlin, Tex.	U.S. Air Force	B-47	$2,500,000	3 killed
Nov. 17	near Seattle, Wash.	Peninsular Airlines	DC-4	$ 510,000	28 killed
Nov. 23	New York, N. Y.	American Airlines	DC-7	$ 250,000	.....
Nov. 29	Eielson Air Force Base, Alaska	U.S. Air Force	F-84F	$1,000,000	14 killed
Dec. 5	Weymouth, Mass.	U.S. Marine Corps	FJ-2	$ 300,000	1 killed
Dec. 7	Richmond, Va.	U.S. Navy	F2H-3	$ 850,000	.....
Dec. 7	near Point Lookout, Md.	U.S. Navy	XP6M-1	Over $3,000,000	4 killed
Dec. 12	near Moses Lake, Wash.	U.S. Air Force	F-86D	$ 700,000	1 killed

Date	Place	Operator	Type a/c	Est. Loss	No. Killed
Dec. 18	Lincoln, Neb.	U.S. Navy	F9F and others	$6,000,000	3 killed
Dec. 21	near Jacksonville, Fla.	Eastern Airlines	Constellation	$1,500,000	17 killed
Dec. 26	Los Angeles, Calif.	U.S. Air Force	T-33	$ 500,000	1 killed
Dec. 27	Levittown, N. Y.	U.S. Air Force	F-86D	$ 377,000	.....

Accidents Excluded

Fire occurred in five other fatal commercial airline accidents in the U.S. during 1955 but these were not included because other factors were primarily responsible for the accidents and the resulting fatalities (totalling 154). The excluded accidents are:

Jan. 12, near Covington, Ky.,
Trans World Airlines Martin 202-A collided in flight with a DC-3 and burned on ground impact ..... 15 killed

Feb. 19, Sandia Mountain, N. M.,
Trans World Airlines Martin 404 power-on impact with mountain followed by fire..... ..... 16 killed

Mar. 20, near Springfield, Mo.,
American Airlines Convair crash during attempted landing (fuel tank exploded but general fire did not ensue) ..... 13 killed

Oct. 6, Medicine Bow Mountain, Wyo.,
United Air Lines DC-4 power-on impact with mountain followed by fire ..... 66 killed

Nov. 1, near Longmont, Colo.,
United Air Lines DC-6B explosion in rear cargo hold caused by sabotage; fire after impact ..... 44 killed

An accident involving a Pan American Airways Stratocruiser which ditched in the Pacific off the Oregon coast cost 4 lives but this accident did not involve fire, although some original press reports had so indicated.

There were eight foreign commercial airline accidents occurring outside the United States during 1955, each of which resulted in the loss of 12 or more lives and which were reported in the U. S. press or to the NFPA. These were:

Feb. 14, near Rieti, Italy,
Sabena Airlines DC-6 crashed into mountain and burned ..... 29 killed

Mar. 8, near Marcota, Mexico,
Compania Mexicana de Aviacion DC-3 crashed into mountain and burned ..... 26 killed

Apr. 11, South China Sea,
Air India Constellation fire in flight (possible sabotage) ..... 15 killed

May 18, Mt. Kilimanjaro, Kenya Colony,
East African Airways Dakota crashed into mountain and burned ..... 20 killed

July 27, Bulgaria,
El Al Israel Airlines Constellation fire in flight (attacked by Bulgarian fighter planes) ..... 58 killed

Aug. 8, near Voronezh, USSR,
Ilyushin 14 fire in flight ..... 25 killed

Sept. 21, near Idris Airport, Libya,
British Overseas Airways Corp. Argonaut crash fire ..... 15 killed

Oct. 2, Andean Mountains, Peru,
Compania de Aviacion "Faucett" DC-4 engine fire in flight ..... 19 killed

Five major military accidents occurred in 1955 which resulted in 12 or more lives lost and which were similarly excluded as the fire factors were not, in a major way, responsible for the heavy loss of life. They were:

Mar. 6, Formosa,
U. S. Air Force C-54 crashed into mountain and burned ..... 14 killed

Mar. 22, Pali Kea Peak, Hawaii,
U. S. Navy R-6-D crashed into mountain and burned ..... 66 killed

Aug. 11, Freudenstadt, Germany,
2 U. S. Air Force C-119's sustained mid-air collision, crashed and burned ..... 66 killed

Sept. 1, Skwentna, Alaska,
U. S. Air Force C-47 crashed and burned in attempted emergency landing ..... 12 killed

Nov. 17, near Las Vegas, Nev.,
U. S. Air Force C-54 crashed on Mt. Charleston and burned ..... 14 killed

Meeting of Board of Directors

New York, January 26, 1956

Present

Richard E. Vernor, Chairman
T. Seddon Duke, President
John Neale, Vice-President
Henry G. Thomas, Vice-President
Hovey T. Freeman, Secretary-Treasurer
Allen L. Cobb, Past President

W. J. Baker	A. L. Ham
Malcolm S. Blake	Leonard Peterson
A. L. Brown	J. S. Queener
F. R. Fetherston	E. F. Reske
Edward Gaston	Roger H. Wingate

Percy Bugbee, General Manager, Robert S. Moulton, Technical Secretary, Horatio Bond, Chief Engineer, Charles S. Morgan, Assistant General Manager, Merwin Brandon, Chairman, Electrical Section.

1. Plans for the 60th annual meeting to be held at the Hotel Statler, Boston, June 4-8, 1956, as reported by Messrs. Bugbee and Morgan, were approved.

2. Treasurer Hovey T. Freeman reported on the financial situation of the Association indicating prospects for a balanced budget by the end of the fiscal year. The report was accepted.

Executive Office Activities

3. a. Mr. Bugbee reported on the status of the Association membership indicating a total membership of 16,135 as of January 10, the highest figure in the Association's history and representing an increase of approximately 10,000 members in a ten-year period.

b. Mr. Bugbee reported on the Sponsors Committee and indicated that Mr. Colby Chester, Chairman, had asked to be relieved of this responsibility. Mr. Bugbee invited suggestions from Board members.

c. Mr. Moulton reported on publications explaining the status of the Association's publications program and indicating the current continuing increase in the distribution of both educational and technical Association publications.

d. Mr. Morgan reported on advertising, presenting figures showing that the receipts from this source are currently running slightly ahead of estimates.

e. Mr. Bugbee reported on the Public Relations Department and its increasingly effective activities under the direction of Robert W. Schuette, Public Relations Manager.

f. Mr. Bond reported on various activities of the Fire Services Department, with particular reference to the public service rendered by Mr. Warren Y. Kimball, its Manager.

g. Mr. Moulton reported on the Fire Record Department, listing the various fire record publications issued during the year and mentioning both the value of this phase of the Association's activity under the direction of Chester I. Babcock, Manager, and the opportunities for further service which would require additional financial support.

Executive Office Pension Plan

h. Mr. Morgan reported as follows on the Executive Office pension plan:

Nearly ten years have passed since the establishment of the NFPA Retirement Plan of which Messrs. Freeman, Bugbee, and Moulton are Trustees. Although no retirements have occurred in the meantime, the desirability of making certain amendments to the trust agreement has become clearly apparent. Accordingly proposed amendments have been prepared by the original author of the Plan, Willis F. McMartin, which it is believed will improve the position of the Association without significantly increasing our costs or depriving present participants of any existing benefits.

First in importance is an amendment to change the rate at which employees becoming participants after January 1, 1956 are vested with benefits provided in their behalf by the Association. At present such vesting is immediate and total. Amendment provides no vesting during the first five years of participation and thereafter at the rate of 10 per cent per annum, except in cases where termination of services is by reason of permanent disability or retirement at age sixty. In these situations vesting would be in full.

Amendment also provides that in case of termination of services of any participating employee, the Association may recover the appropriate portion of the annual premium paid in advance on behalf of that employee. Amendment further provides that where termination of services is for cause, as for example: dishonesty against NFPA, all retirement values are forfeited.

Also provided are amendments to establish waiver of premium in cases of total and permanent disability and authorization of payments of extra premiums up to $5.00 additional per $1,000.00 of insurance on any substandard medical risks. Any extra premium beyond this limit would be paid by the participating employee.

It was voted to approve these proposals and to instruct the trustees to proceed accordingly.

i. Mr. Bugbee reported on the Electrical Field Service, indicating satisfactory service in this phase of the Association's activities with Mr. Charles L. Smith as Electrical Field Engineer.

j. Mr. Moulton reported on the flammable liquids and gases field service projects, reporting the continuing satisfactory service rendered by Mr. Miles Woodworth, Flammable Liquids Engineer, and Mr. Clark Jones, Gases Engineer. These projects were discussed by Messrs. Fetherston, Neale, Queener and Thomas.

NFPA Sections

4. a. Mr. Morgan reported as Secretary of the Fire Marshals' Section, giving an account of the valuable service currently rendered by the Association in this field.

b. Mr. Brandon reported on developments in the Electrical Section and the plans for the preparation of a 1956 edition of the National Electrical Code.

c. Mr. Reske reported as President of the Society of Fire Protection Engineers and discussed some of the current problems of the Society, particularly that involved in proposals for the establishment of student chapters. He reported a current balance in Society funds of $485.

Regional Meetings

5. The 1955 regional meeting in New Orleans was discussed with many expressions of commendation for the value of this phase of the Association's activity by Messrs. Duke, Neale, Gaston, Baker, Blake, Reske, Cobb, Thomas and Brown. Plans for the 1956 regional meeting in St. Louis on November 26-28 were also discussed. Approval was given to the Executive Office suggestion that the program for this meeting should be developed as a mid-year session of general interest to all members but at the same time its regional flavor should be maintained so as to encourage local members in their efforts to promote attendance.

Advertising Council Report

6-7-8. Mr. Bugbee read a recent report from the Advertising Council on the results of the Fire Prevention Campaign conducted by the Council under NFPA sponsorship. In summary, in the year 1955 the campaign included 4,700,000 lines in daily and weekly newspapers, 110,474,000 radio home impressions, 83,200,000 TV home impressions, 90,000 car cards, 10,000 large display posters and 50 pages in company magazines. The report further stated that "Our research, recently completed, shows that Sparky and his serious message have been received and understood by over 43 per cent of the total population of the United States." Mr. Bugbee pointed out the urgent need for additional funds for this campaign. He then reported that the Kagran Corporation, the firm handling Sparky licenses for NFPA, feels that in 1956 there will be substantial income from licensees and substantial increase in favorable Sparky

publicity as a result of the merchandising program.

Mr. Bugbee also reported that Sparky's Fire Department for children is growing, with nearly 50,000 children already enrolled and with many local units sponsored by local fire departments being established in various sections of the United States and Canada.

Industrial Committee

9. Chairman Allen Cobb of the Industrial Committee reported progress in the field of this committee and consideration of plans for the industrial session of the annual meeting program. He referred to problems encountered in the organization of the new Committee on Industrial Fire Apparatus which has been previously authorized and invited suggestions.

Technical Committee Activities

10. The report of the Technical Advisory Committee was presented by Chairman A. L. Brown as follows:

a. Your Technical Advisory Committee met in New Orleans on November 29th with all members present and discussed in detail the question of relations between the NFPA and the American Standards Association as referred to the committee by action of the Board at its last meeting. The discussion indicated certain inherent difficulties involved in NFPA cooperation with the ASA, particularly in respect to the fact that under present conditions it appears impossible to discharge adequately the obligations of participation in ASA activities without increasing the NFPA staff or diverting present staff time and attention away from essential NFPA activities. We are unable to make any specific recommendations at this time, but will continue our consideration of this subject with the expectation that in due time we may be able to make recommendations for action that may solve at least certain phases of the over-all problem. Meanwhile, we have dealt with the technical difficulties that have held up ASA action on NFPA codes for the prevention of dust explosions by referring this matter to Chairman Hylton R. Brown of the Committee on Dust Explosion Hazards with the request that he proceed with correspondence through which he believed the technicalities of ASA procedure would be met.

By letter of January 13, 1956 to the Technical Advisory Committee, Mr. Brown reported as follows:

"In accordance with the action taken at New Orleans I conferred with Mr. Lamb of the American Standards Association and we quickly settled some of the misunderstandings concerning the recorded votes on the codes in question. Mr. Lamb's memorandum of January 10 to Mr. Moulton stating that the three code revisions presented last November have been acted on favorably by the ASA seems, in my opinion, to clear up this subject and you may wish to include such a statement when you present our report. Mr. Lamb and I are still working on the classification of members of the Dust Explosion Hazards Committee to obtain the balance required by the ASA but I anticipate no great difficulty in obtaining this objective."

b. We have further considered the matter of responsibilities and authority of NFPA representatives serving on committees of other organizations and now recommend Board approval of the following statement to be published in the NFPA Year Book and to be considered as instructions to NFPA representatives. Such a statement, if approved, should also be filed with the sponsors or officers of other committees so that they may understand the position of NFPA representatives.

It shall be understood as a condition of NFPA representation upon a committee of any other organization that the vote of the representative upon any matter requiring a vote by committee members during the preparation of any standard, code, regulation, etc., does not commit the NFPA officially with respect to approval or adoption of that standard or regulation.

Official approval or adoption of any standard or regulation by the NFPA can be given only by vote of the annual meeting or by authorized action of the Board of Directors.

This procedure is consistent with the adoption of any standard prepared within and

voted upon by any of the NFPA's own committees.

When the official approval by the NFPA is needed for a standard or regulation prepared by a committee of any other organization, it shall be the responsibility of any NFPA representative on such committee to bring the matter to the attention of the NFPA office for appropriate action.

It is the intent of the NFPA that its representatives on committees or boards of other organizations will present the point of view of the NFPA, provide information on NFPA policies, activities and standards, as appropriate, and will participate cooperatively in the work of such committees.

Representatives should also consult with the NFPA office in case of uncertainty in respect to the handling of any policy matters. The NFPA office will then consult the Board of Directors, the Technical Advisory Committee or the NFPA technical committee concerned as to the procedure to be followed in each case.

Committee Personnel

c. We recommend confirmation by the Board of Directors of the appointments to technical committees of those individuals whose names had been submitted and also recommend confirmation of the committee appointments incorporated in the 1955-1956 Year Book pursuant to the action of the Board at its last meeting.

d. Since preparation of the list of committee changes, the Technical Advisory Committee has received from R. P. Strong his resignation as Chairman of the Committee on Storage of Combustible Fibres. It now seems appropriate to recommend to the Board for appointment as Chairman Sidney Briggs of Dallas, who has been serving as Vice Chairman.

In view of Chairman Strong's long service dating from the organization of the committee in 1922, we now suggest that the Board appoint him as Honorary Chairman.

A similar situation has developed in the case of Harry E. Newell of the Committee on Flammable Liquids and the Committee on Gases. Mr. Newell was honored at a dinner sponsored jointly by these two committees on January 26, 1956. He has not resigned, but in his retirement is taking no active part in the committee work and his present position is actually only honorary. It seems appropriate at this time to appoint him Permanent Honorary Chairman of both committees. This proposal would continue the recognition which he deserves and at the same time avoid the complication of having as a chairman a man who is not in a position to take any active part in the committee work. Your Technical Advisory Committee recommends the above proposed additional appointments.

This report was approved and the recommendations thereof were adopted.

11. Mr. Moulton reported on committee activities outlining the extensive contributions made to the Association by technical committee chairmen and members.

12. The committee appointments as had been submitted for Board action at the meeting were approved. (See also minute 10. c.)

Safety to Life Committee

13. On recommendation of the Committee on Safety to Life, NFPA Standard No. 101C on Interior Finish was amended by changing the upper limit of Class C interior finish from 175 to 200 on the test scale and by the deletion of all notes. Certain editorial clarifications were also authorized.

Marine Committee

14. Mr. Morgan reported that further consideration had been given by the Marine Committee to the matter of use of liquefied petroleum gas cylinders on motor craft as referred to the Marine Committee by the Board at its last meeting. Mr. Morgan stated that the Committee on Marine Fire Protection had not as yet reached any agreement on this subject, but had referred certain questions to the Committee on Gases for clarification prior to further consideration by the Committee on Marine Fire Protection.

Civil Defense Activities

15. Mr. Bond reported on staff activities in connection with civil defense, particularly our participation in the preparation of the 1955 Review Report of Project East River, which was made for the U. S. Department of Defense, the Federal Civil Defense Administration, and the Office of Defense Mobilization. The 1955 Review Report of Project East River had been released early in January. Mr. Bond described the conclusions of this review report in some detail but summarized it as pointing out that civil defense arrangements were far from what they should be.

Mr. Bond indicated that one of the possible solutions for the present difficulties is to require civil defense functions to be performed by appropriate existing agencies, rather than by special civil defense agencies. He suggested that since the NFPA Committee on Civil Fire Defense has been inactive, it would be in order for the Technical Advisory Committee to consider discontinuing this special committee, referring matters that come up in connection with civil defense to regular NFPA committees. He pointed out that this might require one or two new committees, specifically suggesting one on Fire Department Organization (a subject now partially covered by the Committee on Farm Fire Protection) and a Committee on Emergency Water Supplies.

Communications

16. a. A communication was read from Paul Dannenman of Thomas A. Edison, Inc., retiring Board member, expressing appreciation of the value of NFPA activities and the opportunities for service as a Board member.

b. A communication from Mr. Prescott French suggesting the establishment of a provision for life membership by lump sum payment of annual dues, the amount to be established on an actuarial basis, was considered and referred to the Advisory Committee.

17. At the luncheon following the meeting President Duke presented General Manager Bugbee with a beautiful, suitably engraved silver pitcher. The gift was from the Officers and Directors of the Association in recognition of the forthcoming 35th anniversary of Mr. Bugbee's service with the Association.

Fire Record of Cities, 1955

As Reported by Municipal Authorities

The following tables summarize fire department reports for 1955 in 650 of the 699 cities with population over 20,000 in the United States and Canada.

These statistics have been collected and published in the April QUARTERLIES since 1939. These tables should not be used as a basis of comparisons between cities, as comparisons based on these statistics may be misleading if used without a full understanding of the many factors which should be taken into consideration in making any comparisons between cities. The principal discrepancy results from the wide variation among fire officials as to what constitutes a fire loss. Certain reports include only insured losses, others only uninsured. Whether or not property is insured has no bearing on the actual value of property destroyed. The chance effect of some single loss fire, differences in degree of industrialization, in topography, climate and age of cities are some of the factors that influence the fire record. In other words, fire losses reflect the composite results of many factors in addition to fire department efficiency and therefore the practice of making comparisons among different cities based on these data is to be discouraged.

Fire departments of 559 United States cities and 47 Canadian cities of over 20,000 population have reported their estimates of fire loss, fire alarms, building fires, and false alarms for 1955 to the NFPA Department of Fire Record.

A total of 580 United States cities having more than 20,000 population reported a fire loss for the year 1955 of $218,034,050. Fifty-one Canadian cities having a total population of 3,631,683 reported a loss of $17,551,777 for 1955.

The average loss per person in the 580 U. S. cities reporting losses was $3.69, 2.2 per cent more than the $3.61 average loss in 1954. The per capita loss in the 51 Canadian cities reporting losses was $4.83, a 7.1 per cent increase from 1954.

The average loss per building fire in 517 U. S. cities for 1955 was $931, compared with $943 in 1954. The average building fire loss in 45 Canadian cities was $895 in 1955, $1,028 in 1954.

The total number of building fires reported by 594 U. S. cities was 257,233, an average of 4.0 fires per 1,000 population, as compared with 3.9 building fires per 1,000 population in 1954 and 4.2 in 1953. Fifty-one Canadian cities reported 19,611 building fires in 1955. The number per 1,000 population was 5.1 in 1955 as compared with 4.0 in 1954.

Motor vehicle fires reported by 583 U. S. cities totaled 63,473, an average of 0.98 fires per 1,000 population. Forty-nine Canadian cities reported 2,430 motor vehicle fires, or 0.73 per 1,000.

Fire departments in 593 U. S. cities of more than 20,000 population answered 864,764 alarms in 1955. The number of alarms in 50 Canadian cities was 40,995.

In the United States, 594 cities of over 20,000 reported 63,527 false alarms in 1955. This was 7.4 per cent of the total calls. It will be noted that these are "malicious false alarms," not cases where smoke or steam, etc., was honestly mistaken for fire. The 3,688 false alarms reported by 48 Canadian cities were 9.0 per cent of their total calls.

Fire departments have been very cooperative in furnishing fire loss figures. Most of the 49 nonreporting cities did not record their fire experience. A number of loss figures are indicated in the Tables as preliminary estimates.

1955 FIRE LOSSES, CITIES OF 20,000 POPULATION AND OVER

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
ALABAMA							
Anniston	31,150	46,115	525	232	46	18	7.5
Bessemer	28,471	34,038	246	165	32	6	5.8
Birmingham	298,720	1,809,325e	3,885	1,171	339	369	3.9
Dothan City	21,556	213,878	412	176	41	6	8.2
Florence	23,832	.....	384	105	39	18	4.4
Gadsden	55,528	234,894	788	236	64	58	4.3
Mobile	127,151	471,581c	1,115	556	111	94	4.4
Montgomery	195,098	475,096a,d	1,164	496	77	94	2.5
Phenix City	23,285	.....	.....	.....	.....	.....	.....
Selma	22,629	315,107	176	101	27	2	4.5
Tuscaloosa	46,364	140,483	415	224	34	29	4.8
ARIZONA							
Phoenix	105,042	1,050,525c	2,075	569	181	108	5.4
Tucson	45,064	41,791	1,024	132	62	81	2.9
ARKANSAS							
El Dorado	23,047	84,111	327	82	29	23	3.6
Fort Smith	47,864	.....	1,007	187	119	26	3.9
Hot Springs	29,298	107,947	300	74	40	8	2.5
Little Rock	101,387	.....	1,585	532	311	148	5.2
North Little Rock	42,142	202,126	894	263	59	10	6.3
Pine Bluff	37,147	141,111d	533	219	43	5	5.9
CALIFORNIA							
Alameda	63,425	72,644	722	183	38	78	2.9
Alhambra	51,284	94,765	446	93	49	70	1.8
Arcadia	23,041	31,303	427	83	28	10	3.6
Bakersfield	34,540	132,558c	803	189	91	57	5.5
Berkeley	113,217	149,935	1,907	537	127	60	4.7
Beverly Hills	28,915	325,247e	439	146	53	41	5.1
Burbank	78,318	244,773	774	299	113	8	3.8
Compton	47,893	144,385	678	156	57	14	3.3
Eureka	22,913	28,531	294	148	30	43	6.5
Fresno	90,618	570,208c	861	209	108	145	2.3
Glendale	95,398	499,708	887	287	105	73	3.0
Huntington Park	29,376	101,640c	232	131	39	8	4.5
Inglewood	46,046	697,839	891	156	44	5	3.4
Long Beach	244,072	463,832c	2,013	822	217	51	3.4
Los Angeles	1,957,692	.....	28,296	8,535	2,275	2,111	4.4
Los Angeles County[1]	2,193,995	4,575,473	12,023	2,414	946	719	1.1
Lynwood	25,534	27,027c	402	72	28	10	2.8
Menlo Park Fire Dist.	55,000	195,593	904	158	62	8	2.9
Monrovia	20,274	27,976	355	63	32	5	3.1
Montebello	21,754	32,843	248	83	.....	13	3.8
Monterey Park	20,113	47,110	408	98	39	17	4.9
National City	21,132	15,936	255	44	35	6	2.1
Oakland	380,576	1,934,951	5,533	1,646	379	633	4.3
Ontario	22,823	53,223	286	83	41	4	3.6
Oxnard	21,159	67,640	121	54	30	1	2.5
Palo Alto	25,290	106,506c	598	160	49	29	6.3
Pasadena	104,085	108,635c	1,024	407	130	123	3.9
Pomona	35,157	101,921c	634	119	.....	13	3.4
Redondo Beach	25,208	30,269	425	103	28	11	4.1
Redwood City	25,342	52,643	784	78	53	36	3.1

a. Estimated. c. Building and contents only. d. Insured loss only.
1. Fiscal year ended June 30, 1955. e. Subject to change.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
CALIFORNIA (Continued)							
Richmond	99,218	228,221c	1,195	291	65	35	2.9
Riverside	46,399	90,629c	651	146	63	19	3.2
Sacramento	135,761	.....	.....	.....	.....	.....	.....
San Bernardino	62,792	221,800c	1,079	231	103	63	3.7
San Diego	321,485	933,290a,e	3,701	1,180	320	170	3.7
San Francisco	760,753	.....	10,858	3,194	542	1,714	4.2
San Gabriel	20,204	68,332	159	58	17	4	2.9
San Jose	95,044	869,597c	1,388	199	85	128	2.1
San Leandro	27,498	115,953	575	98	43	13	3.6
San Mateo	41,536	249,841	678	227	59	7	5.5
Santa Ana	45,534	46,560	737	173	85	55	3.8
Santa Barbara	44,764	92,896	674	187	58	22	4.2
Santa Cruz	21,848	108,117	317	83	23	11	3.8
Santa Monica	71,299	563,917	1,010	263	77	52	3.7
South Gate	50,684	150,822	430	192	.....	8	5.8
Stockton	71,660	170,303e	1,284	216	90	49	3.0
Torrance	22,206	48,922	565	97	31	16	4.4
Vallejo	23,164	83,126	671	132	58	81	5.7
Whittier	23,866	23,753	336	154	23	2	6.4
COLORADO							
Colorado Springs	45,268	66,972	549	229	8	55	5.1
Denver	412,856	1,025,000	4,285	1,692	345	412	4.1
Greeley	21,000	26,408	228	107	25	10	5.1
Pueblo	63,561	47,992	637	327	82	33	5.1
CONNECTICUT							
Bridgeport	159,352	.....	.....	.....	.....	.....	.....
Bristol	35,893	109,861c	598	74	50	30	2.1
Danbury	22,424	50,494	536	178	.....	9	7.9
East Hartford	29,340	84,596c	520	93	109	15	3.2
Fairfield	30,370	117,085	269	23	7	3	0.8
Greenwich	40,546	182,456	1,216	205	49	4	5.1
Hamden[1]	29,311	72,557	594	38	37	18	1.3
Hartford	177,073	417,286	2,487	541	295	195	3.1
Manchester	33,906	.....	.....	.....	.....	.....	.....
Meriden	43,747	72,210	637	207	54	40	4.7
Middletown	29,665	70,145	251	46	25	12	1.6
Milford	26,345	95,340	765	161	46	18	6.1
New Britain	73,663	145,274	1,018	234	65	63	3.2
New Haven	163,344	381,038c	2,694	690	190	197	4.2
New London[2]	30,367	211,125a,c	487	101	39	32	3.3
Norwalk	49,458	215,247e	1,133	254	74	15	5.1
Norwich	23,382	127,448c	396	123	27	5	5.3
Stamford	73,584	204,142a	841	164	76	48	2.2
Stratford	23,620	89,290	501	77	28	329	3.3
Torrington	27,770	34,584b	337	109	11	10	3.9
Waterbury	104,242	765,223	1,960	407	125	88	3.9
West Hartford	44,401	97,038	610	202	34	6	4.6
West Haven Twp.	31,876	74,064	533	30	13	24	0.9
DELAWARE							
Wilmington	109,907	354,170	1,327	683	156	56	6.2
DISTRICT OF COLUMBIA							
Washington, D. C.	797,670	2,299,655	10,795	2,322	679	1,156	2.9

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.
1. Fiscal year ended June 30, 1955. 2. Fiscal year ended September 30, 1955.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
FLORIDA							
Daytona Beach	29,254	177,229	410	99	32	33	3.4
Fort Lauderdale	40,000	75,039c	632	132	50	21	3.3
Gainesville	26,577	.....	.....	.....	.....	.....	.....
Jacksonville	198,800	1,130,695	3,199	714	140	216	3.6
Key West	21,724	26,240	247	92	28	12	4.2
Lakeland	30,846	48,028c	456	169	38	33	5.5
Miami	246,983	726,618	3,129	661	176	111	3.7
Miami Beach	45,541	39,505	567	239	72	42	5.3
Orlando	51,826	.....	.....	.....	.....	.....	.....
Panama City	26,248	.....	.....	.....	.....	.....	.....
Pensacola	43,293	220,467	448	172	35	0	4.0
St. Petersburg	95,712	84,032c	1,450	268	84	9	2.8
Tallahassee	27,158	126,719c	688	98	46	29	3.6
Tampa	124,073	983,159	2,781	647	146	161	5.2
West Palm Beach	43,053	60,310	394	56	31	16	1.3
GEORGIA							
Albany[5]	30,987	181,028	885	479	96	10	15.5
Athens	20,102	35,488c	358	139	30	24	6.9
Atlanta	327,090	1,928,434	6,011	1,803	785	291	5.5
Augusta	71,507	180,609	832	440	91	43	6.2
Columbus	79,510	100,597	743	336	57	88	4.2
Decatur	21,626	45,423	216	83	19	3	3.8
East Point	21,628	70,630	424	118	27	47	5.5
La Grange	24,954	72,683	302	71	46	10	2.8
Macon	70,106	.....	.....	.....	.....	.....	.....
Marietta	20,628	125,762c	313	105	30	37	5.1
Rome	29,617	75,973c	470	324	20	28	11.1
Savannah	119,689	220,587	1,381	903	104	160	7.6
Valdosta	20,004	74,261	365	181	32	9	9.0
IDAHO							
Boise	34,152	54,159	517	85	15	33	2.5
Pocatello	25,882	40,880c	188	115	30	13	4.4
ILLINOIS							
Alton	32,176	96,025	413	240	43	4	7.5
Aurora	50,508	131,860	740	98	55	41	1.9
Belleville	32,701	147,346	399	78	50	0	2.4
Berwyn	51,176	221,000	733	81	22	11	1.6
Bloomington	34,048	84,464c	1,115	178	31	18	5.2
Champaign	39,397	699,000	320	230	24	12	5.8
Chicago	3,606,436	7,800,000a	37,698	14,259	5,191	2,292	4.0
Chicago Heights	24,369	.....	.....	.....	.....	.....	.....
Cicero	67,197	110,850c	949	170	66	55	2.5
Danville	37,892	92,521	509	104	51	1	2.7
Decatur	67,803	139,969	621	369	94	15	5.4
East St. Louis	81,950	393,778	1,193	546	99	92	6.7
Elgin	42,003	58,679c	459	73	35	16	1.7
Elmhurst	21,204	25,660	189	45	19	7	2.1
Evanston	73,030	163,211	1,007	261	37	29	3.6
Freeport	22,425	610,807	.....	42	7	.....	1.9
Galesburg	31,357	88,475	315	91	38	9	2.9
Granite City	29,139	58,520	391	148	45	15	5.1
Harvey	20,636	34,156	357	85	34	9	4.1
Jacksonville	20,374	30,146c	436	221	40	17	10.8
Joliet	52,460	253,065	1,104	214	42	35	4.1
Kankakee	25,873	264,540	608	62	14	10	2.4

a. Estimated. c. Building and contents only. 5. Fiscal year ended September 1, 1955.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
ILLINOIS (Continued)							
Maywood	27,409	36,995	316	142	27	13	5.2
Moline	37,296	.....	.....	.....	.....	.....	.....
Oak Park	63,175	350,399	1,037	242	44	20	3.8
Ottawa	22,000	18,810	148	22	24	4	1.0
Pekin	21,912	83,199	206	126	29	1	5.8
Peoria	111,523	386,426	1,422	436	142	115	3.9
Quincy	41,402	215,165	491	105	29	20	2.5
Rockford	92,503	124,378	1,052	519	116	23	5.6
Rock Island	48,594	267,258	551	144	38	27	3.0
Springfield	80,832	451,983	1,091	495	100	17	6.1
Urbana	22,995	17,060	188	40	27	8	1.3
Waukegan	39,099	311,314	1,080	174	47	10	4.5
INDIANA							
Anderson	46,809	70,018c	868	336	92	53	7.2
Bloomington	28,191	24,510	522	124	48	6	4.4
East Chicago	54,124	119,220	803	261	57	110	4.8
Elkhart	35,556	538,088	747	288	15	34	8.1
Evansville	109,869	914,156	3,511	1,121	178	217	10.2
Fort Wayne	132,840	76,395	1,854	867	60	104	6.5
Gary	132,496	316,072	2,310	432	131	322	3.3
Hammond	87,423	5,000,000a,b,c	1,971	504	108	72	5.8
Indianapolis	424,683	815,053c	6,408	2,379	572	804	5.6
Kokomo	38,600	66,118c	459	214	49	51	5.5
Lafayette	35,508	49,205c	588	92	67	31	2.5
Logansport	20,933	47,055c	554	137	51	36	6.6
Marion	30,059	.....	.....	.....	.....	.....	.....
Michigan City	28,379	36,845c	513	246	48	29	8.7
Mishawaka	32,878	27,742	394	131	30	36	4.0
Muncie	58,364	414,566c	889	453	96	40	7.8
New Albany	29,297	123,500	447	248	31	25	8.5
Richmond	39,504	90,350	474	276	48	18	7.0
South Bend	115,698	265,088	1,539	302	61	92	2.6
Terre Haute	64,047	229,924	1,127	427	78	35	6.7
IOWA							
Ames	23,105	22,607	239	127	28	15	5.5
Burlington	30,639	86,939	472	52	9	3	1.7
Cedar Rapids	72,149	184,040	815	460	93	25	6.4
Clinton	30,151	49,974	734	179	56	10	5.9
Council Bluffs	45,184	75,948	521	156	49	28	3.5
Davenport	73,640	265,231	959	372	32	68	5.1
Des Moines	176,954	1,523,071	2,674	682	227	95	3.8
Dubuque	49,528	236,941	799	321	65	10	6.5
Fort Dodge	25,025	241,861c	339	70	18	30	2.8
Iowa City	27,018	386,876	198	86	26	1	3.2
Marshalltown	20,000	64,653c	254	119	29	6	5.9
Mason City	27,593	43,747	387	73	33	1	2.6
Ottumwa	33,640	434,008	647	262	31	3	7.8
Sioux City	84,035	240,342e	998	443	95	32	5.3
Waterloo	64,354	273,821a	872	395	72	78	6.1
KANSAS							
Hutchinson	33,524	52,705	569	250	60	2	7.5
Kansas City	129,583	167,362	1,506	492	183	37	3.8
Lawrence	23,292	322,704	351	137	31	4	5.9
Leavenworth	20,543	28,929	373	123	33	2	6.0

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
KANSAS (Continued)							
Pittsburg	25,134	29,368	412	92	24	0	3.7
Salina	26,141	91,090	530	166	44	11	6.4
Topeka	77,827	543,672	961	317	108	66	4.1
Wichita	166,306	546,239	2,767	657	282	54	4.0
KENTUCKY							
Ashland	31,228	.....	.....	.....	.....	.....	.....
Covington	64,282	33,880	695	428	62	42	6.7
Lexington	54,449	.....	.....	.....	.....	.....	.....
Louisville	367,359	472,432a	4,605	2,320	539	313	6.3
Newport	31,015	.....	.....	.....	.....	.....	.....
Owensboro	33,983	45,823e	647	221	47	6	6.5
Paducah	32,430	275,358	867	64	53	30	2.0
LOUISIANA							
Alexandria	34,685	66,835c	330	64	29	34	1.8
Baton Rouge	123,957	719,728	1,476	438	94	154	3.5
Lafayette	33,465	200,289	351	168	36	19	5.0
Lake Charles	41,202	357,000	455	116	40	65	2.8
Monroe	38,375	334,529c	1,014	76	.....	27	2.0
New Orleans	567,257	1,138,720	4,901	1,375	190	245	2.4
Shreveport	125,506	809,278	1,601	534	118	91	4.3
MAINE							
Auburn	23,078	.....	522	242	45	7	10.5
Augusta	20,900	38,051c	355	160	38	2	7.7
Bangor	31,473	168,567c	655	312	67	54	9.9
Biddeford	20,700	18,490	266	146	20	4	7.1
Lewiston	41,142	69,518	682	206	48	12	5.0
Portland	76,936	98,495	1,660	171	63	117	2.2
South Portland	21,732	.....	.....	.....	.....	.....	.....
MARYLAND							
Baltimore	940,205	5,568,357	13,842	6,022	1,026	1,177	6.4
Cumberland	37,632	.....	382	190	52	17	5.1
Hagerstown	36,232	135,900a	455	247	45	25	6.8
Montgomery County	163,749	758,247	1,928	855	219	28	5.2
MASSACHUSETTS							
Arlington	43,984	40,256c	1,139	68	61	65	1.5
Attleboro	23,665	100,040c	565	66	34	17	2.8
Belmont	27,379	99,129c	738	231	35	45	8.4
Beverly	28,855	64,221c,e	1,054	327	62	10	11.3
Boston	790,863	.....	17,525	2,780	727	2,451	3.5
Braintree	23,130	130,335	906	144	27	26	6.2
Brockton	62,856	133,335a	1,798	331	73	84	5.3
Brookline	56,952	200,907a,c	1,245	650	140	58	11.4
Cambridge	120,676	956,761c	2,850	547	40	306	4.5
Chelsea	39,038	134,771	1,378	97	13	92	2.5
Chicopee	48,939	78,132	832	154	49	33	3.2
Everett	45,789	193,801b,c	914	170	60	67	3.7
Fall River	111,759	164,177c	1,496	443	80	176	4.0
Fitchburg	42,671	255,774a,c	1,281	120	40	24	2.8
Framingham	27,845	.....	.....	.....	.....	.....	.....
Gloucester	25,048	378,593a	782	176	31	23	7.0
Haverhill	47,213	451,671c	1,534	318	71	87	6.7

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
MASSACHUSETTS (Continued)							
Holyoke	54,441	150,578c	1,105	435	75	62	8.0
Lawrence	80,427	150,000e	1,958	280	110	121	3.5
Leominster	24,084	90,713	539	114	36	15	4.8
Lowell	96,523	.....	2,196	611	150	65	6.3
Lynn	99,521	.....	2,665	643	125	180	6.5
Malden	59,779	227,730a	1,322	100	55	38	1.7
Medford[3]	66,109	171,105	1,805	279	83	129	4.2
Melrose	26,919	52,354c	744	25	.....	12	0.9
Methuen	24,411	72,114a	783	118	36	30	4.8
Milton	22,395	75,000a	737	73	40	27	3.3
New Bedford	109,033	153,033b	935	285	71	97	2.6
Newton	80,996	352,379	2,180	526	43	63	6.5
North Adams	21,475	46,577	454	206	45	26	9.6
Northampton	28,998	319,825	460	171	41	18	5.9
Peabody	22,647	111,443	1,080	191	35	27	8.5
Pittsfield	53,055	207,452b	905	128	65	45	2.4
Quincy	83,190	393,718a	2,728	435	118	137	5.2
Revere	36,663	172,248	1,444	119	46	137	3.2
Salem	41,842	296,348	1,173	249	102	47	6.0
Somerville	102,254	312,586	1,984	332	97	213	3.3
Springfield	162,601	.....	.....	.....	.....	.....	.....
Taunton	40,056	43,951c	793	201	37	52	5.0
Waltham	47,198	333,842	1,383	202	65	49	4.3
Watertown	37,339	120,797c	1,314	110	38	66	2.9
Wellesley	20,847	5,828b	666	53	37	29	2.5
Westfield	20,961	44,399	695	120	36	9	5.7
West Springfield	20,398	77,784	536	129	36	17	6.3
Weymouth	32,695	98,998	1,138	104	50	30	3.2
Woburn	20,269	65,391	1,240	48	42	125	2.4
Worcester	201,885	689,087b	4,472	1,020	113	517	5.1
MICHIGAN							
Ann Arbor	47,279	235,468c	498	66	51	10	1.4
Battle Creek	48,469	278,215	739	174	46	63	3.6
Bay City	52,372	521,522	755	350	63	17	6.7
Dearborn	94,529	225,910	1,073	246	67	103	2.6
Detroit	1,838,517	7,495,847	18,273	5,862	1,386	2,232	3.2
East Detroit	21,373	86,248	245	135	21	2	6.3
East Lansing	20,310	15,857	194	22	19	2	1.1
Ferndale	29,670	390,116	351	102	35	17	3.4
Flint	162,800	543,022	2,336	743	200	156	4.6
Grand Rapids	175,647	461,248	1,682	281	74	89	1.6
Hamtramck	43,245	83,482	754	343	42	54	7.9
Highland Park	46,155	148,298	787	254	70	54	5.5
Jackson	50,904	69,466c	627	270	45	50	5.3
Kalamazoo	51,326	525,402c	758	176	63	36	3.4
Lansing	91,694	595,141c	2,945	339	107	111	3.7
Lincoln Park	29,265	38,412	461	103	48	54	3.5
Monroe	21,275	39,103	250	127	25	14	6.0
Muskegon	48,047	115,435	575	312	54	.....	6.5
Pontiac	73,112	182,770	1,530	439	102	117	6.0
Port Huron	35,297	267,917	503	151	37	35	4.3
River Rouge	20,366	150,815	271	127	43	15	6.2
Royal Oak	46,817	95,588	832	421	82	74	9.0
Saginaw	92,352	214,662c	1,515	228	88	53	2.5
Wyandotte	36,666	192,262	416	198	56	39	5.4

a. Estimated. b. Incomplete. c. Building and contents only.
3. Includes January 1956 losses.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
MINNESOTA							
Austin	23,035	165,093	188	121	14	3	5.3
Duluth	104,066	392,032	1,100	204	48	35	2.0
Minneapolis	517,277	2,752,609	4,266	966	321	266	1.9
Rochester	29,634	65,275	334	179	19	56	6.1
St. Cloud	22,744	25,489	225	115	13	2	5.1
St. Louis Park	22,495	189,710	391	131	21	0	5.8
St. Paul	309,474	1,762,022a	3,838	1,465	310	353	4.7
Winona	24,965	117,327	300	122	29	38	4.9
MISSISSIPPI							
Biloxi	37,034	48,020	201	65	31	13	1.8
Greenville	29,914	49,668c	555	218	54	20	7.3
Gulfport	22,428	.....	545	116	31	20	5.2
Hattiesburg	29,432	55,130	472	114	28	11	3.9
Jackson	97,674	200,215	1,038	397	95	53	4.1
Laurel	24,988	.....	.....	.....	.....	.....	.....
Meridian	41,709	210,361	545	230	45	42	5.5
Natchez	22,678	.....	837	257	30	13	11.3
Vicksburg	27,344	91,510	407	44	14	7	1.6
MISSOURI							
Cape Giradeau	21,539	38,455	297	119	29	2	5.5
Columbia	31,731	43,912	336	136	26	14	4.3
Hannibal	20,486	26,125	174	84	34	3	4.1
Independence	36,832	152,707	410	171	53	8	4.7
Jefferson City	24,990	112,295c	367	82	23	8	3.3
Joplin	37,188	.....	.....	.....	.....	.....	.....
Kansas City	439,646	2,141,942	5,154	1,827	556	447	4.2
St. Joseph	75,572	233,407	1,130	392	105	59	5.2
St. Louis[4]	852,623	1,202,365a,b	7,776	2,537	876	1,053	3.0
Sedalia	20,269	52,364	261	165	27	2	8.1
Springfield	66,302	318,050	1,232	303	124	33	4.6
University City	39,595	44,520	1,081	70	21	10	1.8
Webster Groves	23,289	19,480	232	19	18	2	0.8
MONTANA							
Billings	31,725	271,693c	197	65	36	26	2.0
Butte	32,904	142,598e	501	146	25	146	4.4
Great Falls	39,006	88,689a,c	476	124	30	23	3.2
Missoula	22,320	.....	306	52	14	19	2.3
NEBRASKA							
Grand Island	22,835	9,554	701	114	23	13	5.0
Hastings	20,108	58,881	254	75	25	15	3.7
Lincoln	97,423	168,790	1,076	492	129	28	5.1
Omaha	247,408	1,200,000a	2,656	1,094	345	61	4.4
NEVADA							
Las Vegas	24,418	224,780c	846	142	81	10	5.8
Reno	32,225	330,102c	1,034	246	99	17	7.6
NEW HAMPSHIRE							
Concord	27,984	425,425c	608	332	68	17	11.9
Manchester	82,581	788,242c,e	1,240	244	76	38	3.0
Nashua	34,666	68,323c	523	247	40	6	7.1

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.
4. April 1, 1955 to January 31, 1956.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
NEW JERSEY							
Atlantic City	61,642	1,053,791	812	392	59	83	6.4
Bayonne	76,657	.....	886	149	57	77	1.9
Belleville	32,059	313,736	506	131	60	56	4.1
Bloomfield	49,313	84,501	576	201	37	31	4.1
Camden	125,546	.....	.....	.....	.....	.....	.....
Clifton	64,567	283,970	756	99	72	59	1.5
East Orange	78,057	152,424	862	288	78	38	3.7
Elizabeth	112,675	361,614c	1,024	190	113	72	1.7
Englewood	23,092	.....	405	217	42	41	9.4
Fair Lawn	23,865	25,655	173	72	7	6	3.0
Garfield	27,605	.....	.....	.....	.....	.....	.....
Hackensack	29,207	.....	.....	.....	.....	.....	.....
Hillside	21,000	76,987	327	197	23	3	9.4
Hoboken	50,510	197,151c	968	286	61	61	5.7
Irvington	59,142	60,128	446	220	48	38	3.7
Jersey City	300,447	3,102,095	3,408	1,199	276	236	4.0
Kearny	39,828	1,119,651	530	114	70	38	2.9
Linden	30,434	75,100	558	161	48	35	5.3
Long Branch	23,094	136,575	379	172	8	12	7.5
Maplewood	25,000	12,593	306	92	27	17	3.7
Montclair	43,775	184,990	657	80	73	23	1.8
Newark	437,857	3,756,097a	5,964	2,691	649	592	6.1
New Brunswick	38,768	125,740c	582	154	41	43	4.0
North Bergen Twp.	39,714	50,740	973	75	65	34	1.9
Nutley	26,746	50,443	475	100	30	31	3.7
Orange	38,413	120,650	527	204	41	18	5.3
Passaic	57,851	530,235c	703	307	54	52	5.3
Paterson	139,423	.....	.....	.....	.....	.....	.....
Perth Amboy	41,291	.....	.....	.....	.....	.....	.....
Plainfield	42,212	.....	594	185	51	22	4.4
Rahway	21,287	22,801	348	107	18	8	5.0
Teaneck Twp.	34,000	150,088	831	180	47	4	5.3
Trenton	127,867	367,350	1,418	494	135	144	3.9
Union City	55,322	390,662c	1,038	238	49	27	4.3
Union Twp.	39,000	223,200	703	194	56	4	5.0
West New York	37,754	82,143c	666	97	.....	23	2.6
Westfield	21,335	33,600	267	108	26	1	5.1
West Orange	28,624	.....	427	36	54	9	1.3
NEW MEXICO							
Albuquerque	97,000	.....	.....	.....	.....	.....	.....
Roswell	25,572	76,810	327	115	35	22	4.5
Santa Fe	29,750	75,035	229	86	23	16	2.9
NEW YORK							
Albany	134,382	669,332	1,825	722	141	299	5.4
Amsterdam	32,269	206,300c	301	117	18	13	3.6
Auburn	36,667	108,987	400	157	26	12	4.3
Binghamton	81,132	108,204	788	392	67	32	4.8
Buffalo	477,393	1,864,325a	3,649	1,162	259	433	2.4
Cohoes	21,235	192,727	373	86	21	6	4.1
Elmira	49,690	62,357	533	171	40	31	3.4
Endicott	20,168	18,515c	183	61	20	8	3.0
Freeport	24,589	.....	.....	.....	.....	.....	.....
Gloversville	23,576	90,548c	259	120	24	17	5.1
Hempstead	29,021	.....	.....	.....	.....	.....	.....
Irondequoit Twp.	34,045	.....	.....	.....	.....	.....	.....
Ithaca	29,395	243,508	200	87	26	7	3.0
Jamestown	43,250	123,118c	569	49	30	20	1.1

a. Estimated.

c. Building and contents only.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
NEW YORK (Continued)							
Kenmore	20,332	29,079	86	24	5	5	1.2
Kingston	28,860	.....	.....	.....	.....	.....	.....
Lackawana	27,646	21,995	278	36	8	49	1.3
Lockport	25,136	40,465	325	104	16	25	4.1
Middletown	22,565	9,472	310	119	13	11	5.3
Mount Vernon	71,837	263,195	1,065	261	40	40	3.6
Newburgh	31,924	35,902	301	158	37	13	5.0
New Rochelle	59,626	195,824	785	331	54	28	5.5
New York	7,835,099	23,740,885	88,969	23,052	4,736	10,008	2.9
Niagara Falls	90,875	165,333	1,211	308	70	90	3.4
North Tonawanda	24,730	247,780	376	83	13	13	3.4
Olean	22,842	20,975c	243	27	23	16	1.2
Oswego	22,611	92,195c	233	92	9	9	4.1
Port Chester	23,969	.....	.....	.....	.....	.....	.....
Poughkeepsie	40,975	251,987e	488	207	37	26	5.1
Rochester	331,252	543,932c	3,460	827	157	185	2.5
Rockville Centre	22,274	42,263	181	57	29	17	2.6
Rome	41,379	54,872c	.....	465	24	21	11.2
Schenectady	92,070	.....	.....	.....	.....	.....	.....
Syracuse	220,067	1,094,541	1,503	636	198	146	2.9
Troy	71,659	229,763	1,351	594	73	25	8.3
Utica	101,479	679,218	849	323	107	38	3.2
Valley Stream	26,833	46,212	138	17	18	10	0.6
Watertown	34,280	58,536c	387	127	35	28	3.7
White Plains	43,501	88,005	691	215	39	45	4.9
Yonkers	152,533	714,881	2,280	626	133	102	4.1
NORTH CAROLINA							
Asheville	52,208	102,281	691	60	52	52	1.1
Burlington	24,495	90,464	455	173	39	20	7.1
Charlotte	133,219	614,868	2,453	773	152	350	5.8
Durham	70,307	217,679c	822	513	91	42	7.3
Fayetteville	34,605	94,634	696	240	59	78	6.9
Gastonia	23,003	34,965c	390	163	31	29	7.1
Goldsboro	21,399	60,597	700	244	38	27	11.4
Greensboro	73,703	147,868c	1,000	432	105	79	5.9
High Point	39,930	146,733c	670	311	44	40	7.8
Raleigh	65,123	192,275	962	413	71	136	6.3
Rocky Mount	27,644	35,244	341	95	26	19	3.4
Wilmington	44,925	84,010b,c	625	320	37	105	7.1
Wilson	22,964	50,331	400	206	31	29	9.0
Winston-Salem	86,816	.....	.....	.....	.....	.....	.....
NORTH DAKOTA							
Fargo	37,981	186,737d	632	205	71	14	5.4
Grand Forks	26,617	49,617	257	158	20	26	5.9
Minot	21,924	71,578	288	101	22	1	4.6
OHIO							
Akron	273,189	933,413	2,293	739	259	243	2.7
Alliance	26,112	35,300	311	71	23	23	2.7
Ashtabula	23,093	252,127	370	117	25	9	5.1
Barberton	27,893	6,865	317	104	34	47	3.7
Canton	116,312	471,198c	817	121	92	126	1.0
Chillicothe	20,121	63,521	426	.....	.....	21	.....
Cincinnati	500,510	788,320	5,606	1,978	535	507	4.0
Cleveland	905,636	2,820,055a	9,751	2,502	735	977	2.8
Cleveland Heights	58,782	70,170	1,024	216	40	7	3.7

a. Estimated. b. Incomplete. c. Building and contents only. d. Insured loss only.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
OHIO (Continued)							
Columbus	374,770	998,540	13,214	2,317	547	213	6.2
Cuyahoga Falls	29,076	41,642b	383	163	19	28	5.6
Dayton	243,108	296,905	3,523	582	233	289	2.4
East Cleveland	39,875	24,178	472	75	26	16	1.9
East Liverpool	24,072	24,664c	421	126	30	18	5.3
Elyria	30,197	75,671	234	105	30	3	3.5
Euclid	41,447	125,600	581	175	41	19	4.2
Findlay	23,806	789,156	304	119	33	3	5.0
Garfield Heights	21,606	13,282	150	28	10	0	1.3
Hamilton	57,717	296,002	1,226	254	71	37	4.4
Lakewood	67,878	198,048	231	78	31	28	1.2
Lancaster	24,140	81,478	1,076	65	36	6	2.7
Lima	49,880	195,570	574	285	53	28	5.7
Lorain	50,819	96,220	590	121	47	50	2.4
Mansfield	43,363	59,204c	632	294	96	14	6.8
Marion	33,786	63,836	532	93	48	15	2.8
Massillon	29,524	37,405c	311	117	33	21	4.0
Middletown	33,634	360,421	499	163	36	53	4.9
Newark	34,178	80,024	726	197	24	54	5.8
Norwood	34,626	24,815	212	99	37	9	2.9
Parma	28,852	52,230	860	54	32	7	1.9
Portsmouth	36,663	.....	.....	.....	.....	.....	.....
Sandusky	29,060	63,863	694	159	24	16	5.5
Shaker Heights	27,980	84,735	376	235	40	16	8.4
Springfield	78,029	39,157	1,069	539	132	45	6.9
Steubenville	35,695	83,980c	362	73	29	65	2.0
Toledo	301,358	804,567	2,542	1,006	272	223	3.3
Warren	49,674	53,603	525	110	68	40	2.2
Youngstown	167,643	128,215	1,430	397	133	111	2.4
Zanesville	40,424	225,051	392	207	51	55	5.1
OKLAHOMA							
Enid	35,976	534,729	500	212	54	17	5.9
Lawton	34,527	254,595	583	257	48	9	7.5
Muskogee	37,255	69,460c	655	134	46	26	3.6
Norman	26,972	43,334c	503	173	18	1	6.4
Oklahoma City	242,450	890,444	3,389	1,169	276	142	4.8
Ponca City	20,185	53,501	312	121	61	6	6.0
Shawnee	24,457	15,000a,c	286	71	62	15	2.9
Stillwater	20,155	73,458	198	79	23	3	3.9
Tulsa	180,586	554,276	2,458	809	151	156	4.5
OREGON							
Eugene	35,672	128,680	604	36	36	19	1.0
Portland[1]	371,011	894,896e	4,199	2,759	238	228	7.4
Salem	43,064	187,200	429	286	28	9	6.6
PENNSYLVANIA							
Aliquippa	26,067	7,785	144	75	14	11	2.9
Allentown	106,233	767,435	578	248	58	30	2.3
Altoona	76,844	130,350	689	399	43	102	5.2
Bethlehem	66,027	33,004c	383	110	50	21	1.7
Butler	23,511	77,880	479	336	37	1	14.3
Cheltenham Twp.	23,000	43,560	252	62	17	.....	2.7
Chester	65,824	287,581	712	160	55	43	2.4
Dunmore	20,302	175,140	224	114	12	14	5.6

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.
1. Fiscal year ended June 30, 1955.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
PENNSYLVANIA (Continued)							
Easton	34,410	75,130c	228	126	29	13	3.7
Erie	130,125	190,420	.....	.....	.....	.....	.....
Harrisburg	89,091	.....	.....	.....	.....	.....	.....
Haverford Twp.	40,000	78,027	430	101	11	27	2.5
Hazleton	35,486	.....	.....	.....	.....	.....	.....
Johnstown	62,723	30,509	779	254	49	35	4.1
Kingston	21,061	48,080	77	26	13	9	1.2
Lancaster	63,601	27,478	323	156	28	19	2.5
Lebanon	28,134	15,780	117	56	18	2	2.0
Lower Merion Twp.	49,000	416,999	776	210	45	2	4.3
McKeesport	51,223	328,570	570	253	47	93	4.9
Mount Lebanon Twp.	26,604	113,695	251	73	22	1	2.7
Nanticoke	20,140	8,295	104	22	14	12	1.1
New Castle	48,563	46,900	505	339	15	33	7.0
New Kensington	25,226	.....	.....	.....	.....	.....	.....
Norristown	38,143	.....	.....	.....	.....	.....	.....
Philadelphia	2,064,794	.....	29,605	6,979	1,763	2,374	3.4
Pittsburgh	673,763	2,100,000a	5,633	3,646	301	746	5.4
Pottstown	22,616	5,413c	88	57	0	2	2.5
Pottsville	23,642	57,976	140	56	18	4	2.4
Reading	109,062	395,906	489	161	78	46	1.5
Scranton	124,305	441,000c	1,146	341	108	80	2.7
Sharon	26,305	.....	.....	.....	.....	.....	.....
Uniontown	20,423	19,485c	192	30	30	9	1.5
Upper Darby Twp.	186,000	227,669	578	198	68	2	1.1
Washington	25,898	165,183	211	94	36	10	3.6
Wilkes-Barre	76,638	618,839	616	192	49	59	2.5
Wilkinsburg	31,281	151,291	170	77	21	24	2.5
Williamsport	44,946	175,501	429	243	56	10	5.4
York	59,704	164,562c	294	157	75	38	2.6
RHODE ISLAND							
Central Falls	23,610	62,110a	359	81	21	11	3.4
Cranston	55,130	334,980	1,497	189	63	92	3.4
East Providence	35,791	97,906	919	79	39	42	2.2
Newport	32,090	232,839	417	234	77	25	7.3
Pawtucket	81,180	563,816	1,533	304	102	121	3.7
Providence	274,700	755,848	6,372	395	321	392	1.4
Warwick Twp.	43,027	146,254	1,062	198	72	69	4.6
Woonsocket	50,186	192,119	634	162	39	77	3.2
SOUTH CAROLINA							
Charleston	68,243	3,061,914c	1,003	264	59	219	3.9
Columbia	85,949	411,102c	1,112	562	100	63	6.5
Greenville	57,932	239,460	892	360	94	75	6.2
Spartanburg	36,674	148,426	571	143	47	80	3.9
SOUTH DAKOTA							
Rapid City	25,179	58,623	386	76	20	3	3.0
Sioux Falls	52,161	55,136	498	152	48	12	2.9
TENNESSEE							
Chattanooga	130,333	524,382	2,219	1,192	136	354	9.2
Jackson	30,098	402,814	402	173	19	17	5.8
Johnson City	27,778	41,565	432	168	29	3	6.0
Knoxville	124,183	335,684c	2,049	1,034	153	157	8.3
Memphis	394,012	1,437,118	5,884	2,223	486	147	5.6
Nashville	173,359	523,907c	2,727	1,032	194	244	6.0

a. Estimated. c. Building and contents only.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
TEXAS							
Abilene	47,102	180,000e	688	248	75	38	5.3
Amarillo	73,737	321,346	1,168	213	.....	80	2.9
Austin	131,964	298,693	1,745	364	154	26	2.8
Baytown	22,927	43,454c	250	96	20	1	4.2
Beaumont	93,715	296,538a	1,309	620	100	41	6.6
Brownsville	36,176	44,188c	338	149	22	34	4.1
Brownwood	20,140	.....	.....	.....	.....	.....	.....
Corpus Christi	108,053	199,699c	980	504	104	93	4.7
Dallas	432,927	3,044,028	8,552	1,359	623	209	3.1
Denton	21,345	74,441c	356	107	30	7	5.0
El Paso	130,000	313,468c	1,637	445	350	135	3.4
Fort Worth	277,047	1,432,195	.....	.....	.....	367	.....
Galveston	65,898	112,187c	969	223	66	158	3.4
Harlingen	23,202	78,530a	263	79	28	15	3.4
Houston	594,321	3,061,790	7,213	2,508	566	799	4.2
Laredo	51,694	105,548	353	84	28	25	1.6
Longview	24,445	.....	.....	.....	.....	.....	.....
Lubbock	71,390	271,000c,e	1,118	737	84	41	10.3
Marshall	22,255	147,056c	511	58	28	17	2.6
McAllen	20,005	18,120c	146	72	14	.....	3.6
Midland	21,756	121,341c	378	206	43	7	9.5
Odessa	29,432	100,303c	721	255	87	35	8.7
Orange	21,100	29,862	324	108	32	27	5.1
Paris	21,636	82,632	487	117	39	1	5.4
Pasadena	22,444	38,215	205	79	22	5	3.5
Port Arthur	57,377	153,350c	546	79	84	76	1.4
San Angelo	51,889	152,427c	593	330	65	42	6.4
San Antonio	406,811	1,093,321	4,740	1,433	441	212	3.5
Sherman	20,013	48,056c,e	395	.....	33	49	.....
Temple	24,970	61,927c	341	54	30	11	2.2
Texarkana	24,657	.....	.....	.....	.....	.....	.....
Tyler	38,864	95,051c	626	65	30	12	1.7
University Park	23,823	101,508c	181	25	19	5	1.1
Waco	84,300	651,266	783	362	110	7	4.3
Wichita Falls	67,709	264,494c	1,093	355	70	50	5.2
UTAH							
Ogden	56,910	274,893	1,186	204	52	61	3.6
Provo City	28,901	36,960	325	69	10	10	2.3
Salt Lake City	181,718	383,225	1,913	627	154	102	3.4
VERMONT							
Burlington	33,039	.....	545	.....	32	28	.....
VIRGINIA							
Alexandria	61,604	119,407c	909	382	91	14	6.2
Arlington County	134,990	255,058	4,326	902	142	44	6.7
Charlottesville	25,909	209,199c	389	131	39	10	5.1
Danville	34,537	56,842	.....	.....	.....	23	.....
Hampton	60,994	229,924c	865	286	.....	36	4.7
Lynchburg	47,639	1,576,090a	808	267	26	56	5.6
Newport News	41,571	208,269	776	336	39	79	8.0
Norfolk	188,601	719,187	3,967	1,081	191	449	5.7
Petersburg	34,948	126,543	828	338	43	100	9.7
Portsmouth	71,294	375,555a,e	1,314	349	39	135	4.9
Richmond	229,906	2,180,000	3,720	2,204	348	252	9.6
Roanoke	91,089	313,962	1,242	453	.....	119	5.0
Warwick	39,875	18,920	578	274	38	15	6.9

a. Estimated. c. Building and contents only. e. Subject to change.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
WASHINGTON							
Bellingham	33,934	90,694c	722	85	22	9	2.5
Bremerton	27,746	22,171	426	308	41	20	11.1
Everett	33,807	50,123c	809	172	37	32	5.1
Longview	20,556	34,396	263	103	19	40	5.0
Seattle	462,985	.....	.....	.....	.....	.....	.....
Spokane	160,484	348,737c	2,245	1,275	110	170	8.0
Tacoma	142,975	276,450	2,358	1,234	110	153	8.6
Vancouver	27,977	173,017	542	348	32	4	12.5
Walla Walla	24,071	284,068a	531	80	34	34	3.3
Yakima	38,375	330,991c	621	316	40	11	8.2
WEST VIRGINIA							
Bluefield	21,341	203,045	192	.....	.....	14	.....
Charleston	72,818	172,145c	870	241	84	172	3.3
Clarksburg	31,817	.....	.....	.....	.....	.....	.....
Fairmont	29,273	53,650	258	140	40	1	4.8
Huntington	86,160	310,877	1,342	408	86	141	4.8
Morgantown	25,443	27,930	315	75	11	9	3.0
Parkersburg	40,492	299,059	290	96	39	25	2.4
Weirton	24,143	65,626	180	62	24	1	2.6
Wheeling	58,447	101,674	1,886	356	34	9	6.1
WISCONSIN							
Appleton	33,892	277,644	476	265	29	23	7.8
Beloit	29,541	46,631	463	163	36	28	5.5
Eau Claire	35,862	194,990a	434	175	27	29	4.9
Fond du Lac	29,826	80,681c	361	204	38	19	6.8
Green Bay	52,443	426,778	890	256	52	36	4.9
Janesville	24,829	121,256	513	150	32	18	6.0
Kenosha	54,360	130,574	1,005	290	62	22	5.3
La Crosse	47,396	56,754	738	341	67	25	7.2
Madison	95,594	324,107	746	383	53	28	4.0
Manitowoc	27,444	24,633a	434	168	28	32	6.1
Milwaukee	632,651	2,212,136	6,595	1,495	406	346	2.4
Oshkosh	40,934	56,095b	516	202	46	12	5.0
Racine	70,749	159,715	727	239	49	55	3.4
Sheboygan	42,485	34,211	445	230	25	10	5.4
Superior	35,091	128,886	538	252	32	10	7.2
Waukesha	21,186	.....	.....	.....	.....	.....	.....
Wausau	30,386	40,168	532	187	23	15	6.2
Wauwatosa	33,300	41,956	731	176	30	4	5.3
West Allis	42,945	180,260	929	146	32	35	3.4
WYOMING							
Casper	33,557	648,844c	294	134	15	12	4.0
Cheyenne	31,807	42,766	256	101	24	13	3.2

1955 FIRE LOSSES, CANADIAN CITIES

ALBERTA							
Calgary	135,000	1,716,081	1,499	543	144	153	4.0
Edmonton	158,912	656,725e	1,491	542	64	170	3.4
Lethbridge	23,000	62,809	228	83	23	4	3.6
BRITISH COLUMBIA							
Burnaby	60,000	113,349	611	449	42	4	7.5
New Westminster	30,000	208,109	268	6	34	17	0.2
Saanich	24,000	43,216	551	191	11	10	8.0
Vancouver	385,500	.....	.....	.....	.....	.....	.....
Victoria	50,774	55,581	800	507	52	94	10.0

a. Estimated. b. Incomplete. c. Building and contents only. e. Subject to change.

City	Population (Last Census)	Total Loss 1955	No. Alarms 1955	No. Bldg. Fires 1955	No. Auto Fires 1955	No. Malicious False Alarms 1955	Bldg. Fires Per 1000 Population
MANITOBA							
Brandon	21,214	25,517	298	140	15	15	6.6
St. Boniface	26,214	117,533c	337	234	13	27	8.9
Winnipeg	229,045	.....	.....	.....	.....	.....	.....
NEW BRUNSWICK							
Moncton	30,000	.....	.....	.....	.....	.....	.....
Saint John	63,000	343,817a	1,264	732	39	94	11.6
NOVA SCOTIA							
Glace Bay	28,000	110,000c	118	74	8	3	2.6
Halifax	122,656	362,229	1,765	1,033	37	106	8.4
Sydney	28,305	.....	.....	.....	.....	.....	.....
ONTARIO							
Brantford	36,602	332,680	497	217	16	8	5.9
Chatham	22,000	34,016	236	105	29	22	4.8
East York Twp.	67,000	88,830c	185	44	27	7	0.7
Etobicoke	46,000	132,000c	676	333	35	57	7.2
Fort William	30,585	43,891c	424	266	9	30	8.7
Galt	23,085	124,637	305	140	16	39	6.0
Guelph	25,962	15,931c	504	275	28	1	10.5
Hamilton	196,246	1,087,491c	.....	2,618	.....	.....	13.3
Kingston	36,000	300,016	774	335	55	90	9.3
Kitchener	43,084	380,126	452	220	24	3	5.1
London	94,027	199,357c	1,014	188	.....	29	2.0
Niagara Falls	20,589	312,000	237	56	20	35	2.7
North York Twp.	62,646	237,535e	1,051	411	89	51	6.6
Oshawa	40,727	75,120a,c	431	215	49	8	5.3
Ottawa	220,026	959,061e	2,425	1,385	205	143	6.3
Peterboro	35,065	119,467c	746	63	46	.....	1.8
Port Arthur	32,000	93,391	628	53	16	78	1.7
St. Catharines	37,988	175,915c	489	331	24	7	8.7
Sarnia	35,000	117,102a,c	396	69	27	6	2.0
Sault Ste. Marie	33,000	49,535	541	388	37	20	11.7
Scarboro Twp.	60,000	220,101c	898	128	79	81	2.1
Sudbury	50,222	154,667	481	191	21	.....	3.8
Timmins	26,385	75,277	639	47	22	12	1.8
Toronto	666,467	2,997,653	6,452	2,565	604	715	3.9
Windsor	121,011	550,000a	1,277	520	91	196	4.3
York Twp.	98,000	626,095c	822	173	52	60	1.8
QUEBEC							
Chicoutimi	21,337	39,437	242	194	5	32	9.1
Hull	43,871	138,014	964	248	38	6	5.7
Jonquiere	25,765	.....	452	.....	12	66	.....
Lachine	29,625	87,079	385	63	16	62	2.1
Montreal	1,181,955	.....	.....	.....	.....	.....	.....
Outremont	32,000	110,523c	.....	213	.....	.....	6.7
Quebec	205,115	1,818,225	2,421	1,396	81	501	6.8
Shawinigan Falls	38,000	34,000	252	15	5	21	0.4
Sherbrooke	52,000	145,691c	873	75	30	147	1.4
Three Rivers	53,000	171,686	506	319	22	65	6.0
Verdun	79,050	143,571	726	468	24	117	5.9
Westmount	27,203	33,890	371	55	18	40	2.0
SASKATCHEWAN							
Moose Jaw	25,000	244,714	407	54	7	37	2.2
Regina	69,995	968,149	972	227	40	136	3.2
Saskatoon	53,000	299,938	614	414	29	63	7.8

a. Estimated. c. Building and contents only. e. Subject to change.

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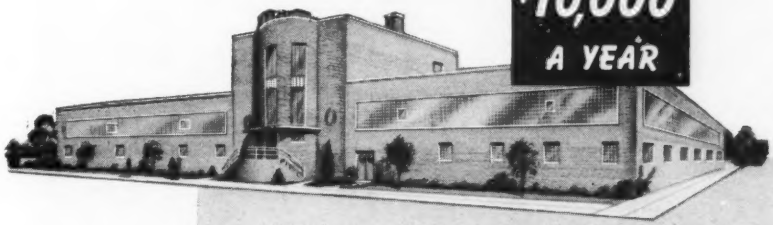


ADT Automatic Protection Services against fire, burglary, and failure of our heating and air-conditioning systems have proved highly satisfactory and much more economical than less effective methods. We estimate our payroll savings at approximately $10,000 a year. These services have afforded us far better protection for our property, profits, and employees' jobs than is otherwise possible, in addition to the substantial savings in actual cost of operation.

TREO COMPANY, INC.

Secretary-Treasurer

Why not find out what ADT can do for you?

Whether your premises are new or old, sprinklered or unsprinklered, there is an appropriate ADT Fire Alarm Service to detect fire and notify the fire department *automatically*. ADT Burglar Alarm Service will *automatically* summon police when burglars attack. ADT Heating and Industrial Process Supervision will *automatically* detect and report other abnormal conditions.

An ADT specialist will show you how combinations of automatic services can safeguard your property. Call our local sales office if we are listed in your phone book; or write to our Executive Offices.

ADT

Controlled Companies of

AMERICAN DISTRICT TELEGRAPH COMPANY

A NATIONWIDE ORGANIZATION

Executive Offices: 155 Sixth Avenue, New York 13, New York

HORTON ELEVATED TANK

Protects Distribution and Processing Food Center

The Chicago Bridge & Iron Company installed the 100,000 gallon Horton ellipsoidal-bottom elevated tank shown above to provide dependable gravity water pressure for The Consolidated Foods Corporation plant's fire protection system. Located at River Grove, Illinois, the plant, a new distribution and regional processing center, also installed a CB&I-built 200,000 gallon umbrella roof suction tank to provide a standby water supply for their fire protection system.

For quotations or information, please contact our nearest office.

CHICAGO BRIDGE & IRON COMPANY

ATLANTA	CHICAGO	LOS ANGELES	SALT LAKE CITY
BIRMINGHAM	DETROIT	NEW YORK	SAN FRANCISCO
BOSTON	HOUSTON	HAVANA	PHILADELPHIA
CLEVELAND	SEATTLE	PITTSBURGH	TULSA

Plants at Chicago, Birmingham, Salt Lake City and Greenville, Pa.

GLOBE
SAVEALL
SPRINKLER

PRODUCT OF THE CHEMICAL AGE

UPRIGHT

PENDENT

For nearly fifty years Globe has designed, manufactured and installed all types of fire protection equipments including wet and dry pipe sprinkler systems, deluge systems and special hazard systems involving fog, foam and CO_2. Write for free copy of "How to Detect and Stop Fire Automatically."

Manufactured and Installed By

GLOBE AUTOMATIC SPRINKLER COMPANY

2035 Washington Avenue

PHILADELPHIA 46, PA.

OFFICES IN PRINCIPAL CITIES

The lower photo shows how well a typical Akbar Fire Door withstood heat and flames that gutted one section of a building, fully protecting areas on the other side of the wall.

Kinnear's Exclusive

AKBAR Steel Rolling Fire Doors*

Tested, fire-proven safety features of Akbar Doors assure maximum protection at openings in case of fire.

When heat releases a fusible link, a strong push-down spring closes Akbar Doors with a positive start.

The emergency closing speed of Akbar Doors is *controlled,* for safety to building occupants.

Another Kinnear safety device prevents the steel curtain from either pulling loose at top or from falling below floor level—even if the sill burns out!

For emergency exit, Akbar Doors can be raised *after* automatic closure — and they close again automatically.

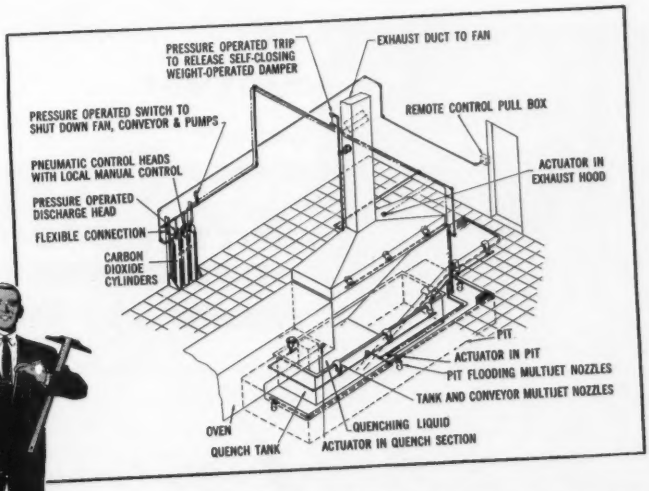
The rugged, interlocking-steel-slat curtain of Akbar Fire Doors remains coiled above the opening—out of the way and out of view — until used. Easily equipped for regular, daily service use, with either manual or motor control. Write for details on additional AKBAR advantages.

*Kinnear AKBAR Steel Rolling Fire Doors, within approved size limits, are labeled by Underwriters' Lab., Inc.

The KINNEAR Manufacturing Co.

Factories: 2250-70 Fields Ave., Columbus 16, Ohio
1742 Yosemite Avenue, San Francisco 24, Calif.

Saving Ways in Doorways
KINNEAR
ROLLING DOORS


PRESSURE OPERATED TRIP TO RELEASE SELF-CLOSING WEIGHT-OPERATED DAMPER
EXHAUST DUCT TO FAN
PRESSURE OPERATED SWITCH TO SHUT DOWN FAN, CONVEYOR & PUMPS
REMOTE CONTROL PULL BOX
PNEUMATIC CONTROL HEADS WITH LOCAL MANUAL CONTROL
ACTUATOR IN EXHAUST HOOD
PRESSURE OPERATED DISCHARGE HEAD
FLEXIBLE CONNECTION
CARBON DIOXIDE CYLINDERS
PIT
ACTUATOR IN PIT
PIT FLOODING MULTIJET NOZZLES
TANK AND CONVEYOR MULTIJET NOZZLES
OVEN
QUENCH TANK
QUENCHING LIQUID
ACTUATOR IN QUENCH SECTION

HAZARDS LIKE QUENCH TANKS... NEED THIS SPECIAL FIRE PROTECTION!

IN THE PLAN ABOVE, you see a typical Kidde fire extinguishing system installation for the protection of one of industry's most dangerous fire hazards. However, *all* Kidde quench tank installations are not exactly like this one, since Kidde treats each quench tank as a *special* hazard which requires *special* fire protection!

Using safe, efficient carbon dioxide, Kidde systems snuff flames quickly, cleanly. The CO_2 leaves no mess to harm machinery or equipment, will not even damage work-in-process. And, thanks to patented Kidde rate-of-temperature-rise detectors, Kidde systems remain on guard 24 hours a day, completely independent of outside power sources.

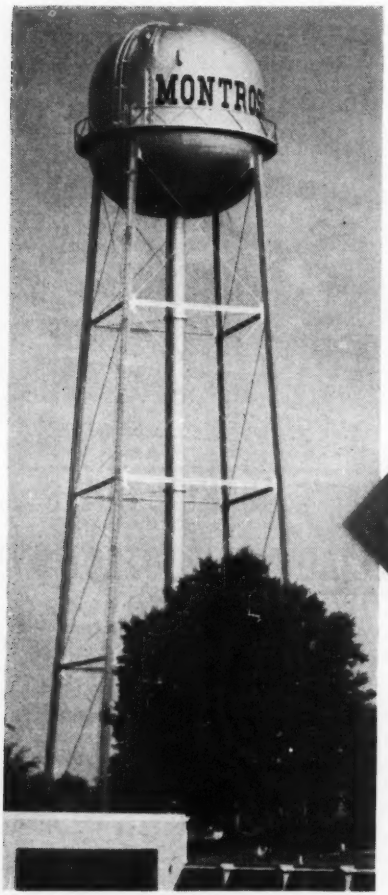
Kidde systems use no clumsy mechanical triggering methods, have no falling weights. Pneumatic or Electrical Control Heads insure instant and complete CO_2 discharge. The moving parts of a Kidde system are self-enclosed for safety, need no replacement after a fire, have easy-to-read visual indicators which show at a glance if system is "set" or "released." What's more, special Directional Valves on the Kidde system let you protect more than one hazard from the cylinder bank, giving you the most versatile protection on the market!

Without obligating yourself in any way, let the Kidde man analyze the fire hazards in your plant. Then let him show you our recommendations. For more information, write Kidde today.

Kidde

Walter Kidde & Company, Inc.
451 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd.
Montreal—Toronto

The words 'Kidde', 'Lux', 'Lux-O-Matic', 'Fyre-Freez' and the Kidde seal are trademarks of Walter Kidde & Company, Inc.



PITTSBURGH
·DES MOINES
Elevated Steel Tanks

The Classic
"100 on a 100"

One hundred thousand gallons, on a hundred-foot tower: that's a most frequent Pittsburgh-Des Moines elevated steel tank specification. And the "100 on a 100" provides top value, too—it is a standard product, handsome in appearance because of fine proportions, but without costly frills. Your plant service and fire protection dollar goes a long way with this popular double-ellipsoidal, low head range design. Let us give you the comparative facts, and consult on your water storage requirement.

PITTSBURGH·DES MOINES STEEL CO.
Plants at PITTSBURGH, DES MOINES and SANTA CLARA
Sales Offices at:

PITTSBURGH (25)	3468 Neville Island	DES MOINES (8)	969 Tuttle Street
NEWARK (2)	250 Industrial Office Bldg.	DALLAS (1)	1273 Praetorian Building
CHICAGO (3)	1272 First National Bank Bldg.	SEATTLE	576 Lane Street
LOS ANGELES (48)	6399 Wilshire Blvd.	SANTA CLARA, CAL.	675 Alviso Road

Report on **TRUSSTEEL*** Stud and **ROCKLATH*** Plaster Base Partition Assembly

ONE-HOUR FIRE RATING

This non-load bearing partition assembly, a product of U.S.G. research, consists of TRUSSTEEL Studs, ROCKLATH Plaster Base with TRUSS-LOK Clip Attachment, and plaster. Finishes to overall wall thickness of 4½", 5¼", 6" and 8", depending on the stud size.

In tests at nationally recognized laboratories, the partition qualified for a one-hour fire rating, and an excellent sound transmission rating of 48 decibels was obtained.

In addition, the ease of concealing pipes, conduits and air ducts within the finished wall results in substantial savings in time and labor costs. Reductions as high as 10% in plumbing and electrical estimates—made possible by the "hollow stud" assembly—have been reported.

Versatility, light weight and strength are further advantages of this partition assembly. For further information, consult your local U.S.G. Architects' Service Representative.

SEE PACIFIC COAST BUILDING OFFICIALS CONFERENCE RESEARCH RECOMMENDATION REPORT NO. 486, DATED JANUARY 7, 1955.

TECHNICAL DATA

TRUSSTEEL Studs in 2½", 3¼", 4" and 6" sizes provide thickness to meet job requirements.

This partition assembly weighs approximately 10 lbs. per square foot when plastered with perlite aggregate plaster, and approximately 15 lbs. per square foot with sand aggregate plaster in any TRUSSTEEL Stud width.

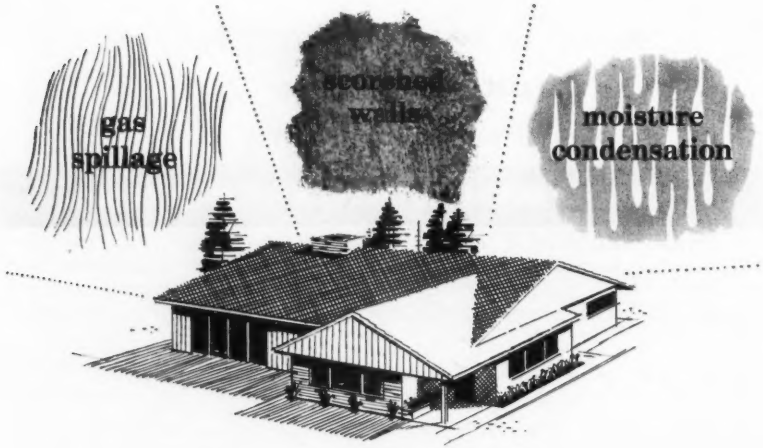
Tests in the U.S.G. structural laboratory show that the partition compares favorably in strength with wood or other metal stud construction used for similar purposes.

*T.M. REG. U.S. PAT. OFF.

The partition system is limited to the use of ⅜" plain or perforated ROCKLATH on studs spaced 16" on centers.

UNITED STATES GYPSUM the greatest name in building

CHICAGO 6, ILLINOIS



CAN YOU BE SURE GAS VENT FAILURES WON'T HAPPEN?

They happen every day in every type of gas-heated home... and the one way to assure owners they won't occur is to insist on a Metalbestos gas venting system that provides:

DOUBLE-WALL INSULATION... the only vent design endorsed by modern scientific research to keep adjacent walls *cool* for fire protection... waste gases *hot* for the strong draft needed to eliminate damaging moisture condensation and stale-gas spillage.

RUGGED GAS-TIGHT CONSTRUCTION... lightweight, durable metals to resist the corrosive effects of vent gases... with tight, secure couplings to keep vent gases *in the vent* for the life of the home.

SCIENTIFICALLY PLANNED INSTALLATION ... versatile lengths and fittings to meet each home's special requirements for correct vent installation... with complete installation instructions based on scientific venting research and development.

with Metalbestos, the modern double-wall gas vent... you're sure it's safe!

For the latest facts about scientific gas venting, write Dept. T-4

METALBESTOS DIVISION

Stocked by principal jobbers in major cities. Factory warehouses in Atlanta, Dallas, Newark, Des Moines, Chicago, New Orleans, Akron

Let this "Visiting Fireman" train your men to fight fire . . . it could save your business

You have a *potential* fire-fighting team right in your plant. These would-be fire fighters *could save your business if fire struck unexpectedly.* All they need is training, the kind that will enable them to respond properly to any kind of fire emergency.

Ansul can provide this training for a group of your men just as it has for hundreds of its customers. And there will be no charge, of course. It is just one of the "essential" services that Ansul provides its customers.

Twenty years experience in the fire protection industry has proved to Ansul many times over that all the fire equipment in the world will not save your business *unless* trained hands are available to man that equipment. So, it is important to Ansul that you get *training* along with the fire equipment you buy. Only then will you experience the security that goes with having a complete fire protection program. Only then will you get what you really pay for, what you really need—*complete fire protection.*

You owe it to the life of your business to learn more about Ansul's in-plant fire training service. Get in touch with your local ANSUL MAN through the yellow pages of your phone directory. He will be happy to call on you and explain all of Ansul's customer services in detail. Or write to THE ANSUL CHEMICAL COMPANY, Dept. QN-4, Marinette, Wisconsin.

ANSUL

Nation Wide
Central Station Protection Services

Sprinkler Valve Alarm — Complete Sprinkler Supervisory — Manual Fire Alarm — Automatic Fire Alarm — Temperature Alarm — Oil Burner Supervision — Burglar Alarm — Hold-Up Alarm — Vault & Safe Protection

Available from these members of

Central Station Electrical Protection Association

ALBANY, NEW YORK	**ALBANY PROTECTIVE SERVICE** **99 Jay Street**
CHICAGO, ILLINOIS	**CENTRAL WATCH SERVICE** **214 West Ohio Street**
CLEVELAND, OHIO	**MORSE SIGNAL DEVICES** **6707 Carnegie Avenue**
DALLAS, TEXAS	**SMITH DETECTIVE AGENCY & NIGHTWATCH SERVICE, INC.** **610 N. Akard Street**
DENVER, COLORADO	**DENVER BURGLAR ALARM COMPANY, INC.** **422 - 21st Street**
DETROIT, MICHIGAN	**MICHIGAN STILL ALARM CO.** **10410 W. Chicago**
HOUSTON, TEXAS	**McCANE-SONDOCK DETECTIVE AGENCY** **1612 Austin Street**
LOS ANGELES, CALIFORNIA	**MORSE SIGNAL DEVICES OF CALIFORNIA** **211 So. LaBrea Avenue**
MILWAUKEE, WISCONSIN	**MERCHANTS POLICE SIGNAL & ALARM CO.** **740 No. Plankinton Avenue**
NEWARK, NEW JERSEY	**NEWARK DISTRICT TELEGRAPH CO.** **372 Plane Street**
NEW YORK, NEW YORK	**CENTRAL STATION SIGNALS, INC.** **53 West 23rd Street**
PHILADELPHIA, PENNA.	**OWL PROTECTIVE CO., INC.** **120 No. Camac Street**
ST. LOUIS, MISSOURI	**POTTER ELECTRIC SIGNAL & MFG. CO., INC.** **1211 Pine Street**
SAN FRANCISCO, CALIF.	**AMERICAN BURGLAR COMPANY, DIVISION OF THE PACIFIC FIRE EXTINGUISHER COMPANY** **165 Jessie Street**
WASHINGTON, D. C.	**FEDERAL ENGINEERING CO., INC.** **1004 Sixth Street, N.W.**

Damage or Disaster?

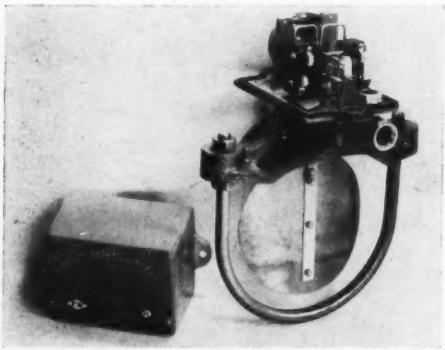
Automatic fire venting with WASCOLITE PYRODOMES could mean the difference between damage and disaster in institutions, commercial and industrial buildings. Look into this latest development in fire protection today. For literature, write to our Engineering Division, Fire-Venting Service, Dept. Q.

WASCO PRODUCTS, INC.
Bay State Road, Cambridge, Massachusetts

CENTRAL STATION SIGNALS, INC.

Manufacturers of all kinds of approved devices used in Central Station Systems or Class 'A' or Class 'B' Proprietary Fire Alarm Systems, either automatic or manual.

53 WEST 23rd STREET. . . . . NEW YORK 10, N. Y.



Model PRS-1

Sprinkler

Waterflow Alarm

This device is approved by Factory Mutual Laboratories and Underwriters' Laboratories, Inc.

- This device is also made as Model PRT-1, a coded waterflow transmitter.

5-inch size shown above. To install simply drill 2-inch hole in pipe.

- Also made in explosion proof models.
- Made in all sizes from 2½" to 8".
- Has instantly recycling pneumatic retarding device, which prevents false alarms.
- Has enclosed electrical contacts for any voltage not exceeding 15 amp. 125 volts, A.C. and ½ amp. 125 volts, D.C. Operates on all water pressures or surges.

Size is 1⅝" x ⅝"

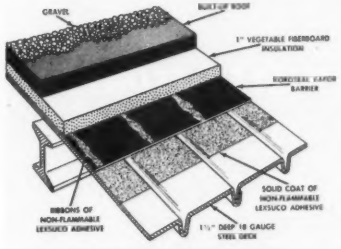
Tempo-Set Model A Fire Detector

Underwriters' Laboratories, Inc. Approved.

- Self restoring and can be heat tested.
- Electrical contacts are silver or gold and are enclosed.
- Very reasonable price.

- Tempo-set Model A is approved in either open or closed circuit and the temperature ratings are 135 and 200 degrees.
- Approved spacing is 20' x 20'.
- Electric ratings are 125 volts 1 ampere, A.C. or 24 volts 0.5 ampere D.C., or less.

Factory Mutual fire test proves superior fire safety of Lexsuco Roof Construction



Lexsuco Roof Vapor Barrier and Securement Construction

The Lexsuco Construction (at left) was recently subjected to a large scale fire test at Factory Mutual Laboratories in Norwood, (Mass.) with a steel deck on a building 100′ x 20′ fired for 30 minutes with gasoline burned to produce the A.S.T.M. time temperature curve.

This test proves conclusively that the Koroseal* Vapor Barrier and non-flammable Lexsuco Adhesive: (1) makes no contribution to fire spread within a building and even when used with combustible vegetable fiberboard insulation does not result in extensive fire spread beyond the zone of direct exposure; (2) does not produce dense black smoke which hampers efficient fire fighting.

Pertinent findings from this and other factory Mutual fire tests: (1) Bituminous materials contribute to fire spread and are undesirable between roof deck and insulation. (2) Spread of fire was due to combustible gases liberated from asphaltic materials which, because of pressures developed, were forced down through deck joints and ignited — spreading the fire on the underside of the deck. (3) Built-up roofing surfaces above the insulation contribute in no way to the spread of an occupancy fire unless the supporting structure collapses. (4) Where the Lexsuco Constructions described in the Factory Mutual Laboratory Report are used without any combustible elements in the building structure, the need for automatic sprinkler protection is determined by the building contents.

*T. M. B. F. Goodrich

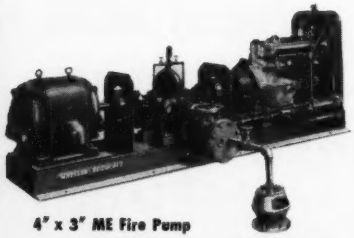
Type of Construction Over 18 Gauge Steel Deck and Under Built-Up Roof Surface	Flame Spread Beyond Exposure Bay Under Steel Deck (Duration of Test—30 Min.)		Visibility Within Building During Test		Asphalt Drippage	Percent of Insulation Consumed	
	% Of Structure	Time In Minutes to Reach Flue End	% Obscured By Black Smoke	Time In Minutes		Fire End	Flue End
2 Ply Mopped Asphalt Vapor Barrier with 1" Vegetable Fiberboard Insulation Secured with Asphalt	100	10.5	100	8	Some	67	67
1" Vegetable Fiberboard Insulation Strip Mopped to Deck With Asphalt	100	12.8	100	7	Some	63	50
Heavy Felt Vapor Barrier Secured By Asphalt Cement With 1" Glass Fiber Insulation Secured With Asphalt	100	12.8	100	7¼	None	50% Of Glass Fiber Insulation Blackened	50% Of Glass Fiber Insulation Blackened
1" Vegetable Fiberboard Insulation Mechanically Fastened to Deck	68	—	0 Burners Visible During Test	—	None	63	6
Lexsuco Koroseal Vapor Barrier and 1" Vegetable Fiberboard Insulation Secured with Non-Flammable Lexsuco Adhesive	46	—	0 Burners Visible During Test	—	None	50	0

Results of Lexsuco test compared with other Factory Mutual fire tests conducted under sponsorship of Metal Roof Deck Technical Institute. Identical procedures, control measures, and recording methods were used in all of these tests.

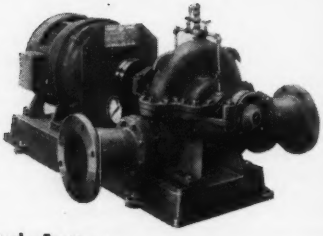
For a complete Factory Mutual Laboratories Test Report on the Lexsuco Construction, write . . .

LEXSUCO INC.
4817 Lexington Ave., Cleveland 3, O.

COMPLETE LINE OF PUMPS FOR FULL FIRE PROTECTION



4" x 3" ME Fire Pump with dual drive.



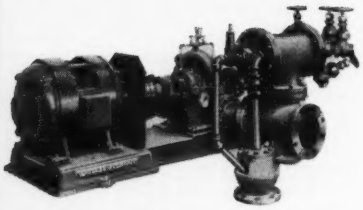
Wheeler-Economy Fire Pump fitted for Booster Service.

WHEELER-ECONOMY FIRE PUMPS

- Centrifugal Fire Pumps
- Centrifugal Booster Pumps
- Tank Filling Pumps

You can recommend Wheeler-Economy Fire Pumps for the needs of all commercial, industrial, public and private buildings.

Years of design, engineering and manufacturing have been devoted by Wheeler-Economy to develop a complete line of approved fire pumps.



Economy Fire Pump complete with Discharge Tee, Hose, Valves, Waste Cone, etc.

Write for Catalog L-154.

WE514

WHEELER-ECONOMY PUMPS

ECONOMY PUMPS, INC., • DIVISION OF C. H. WHEELER MANUFACTURING CO.
19TH AND LEHIGH, PHILADELPHIA 32, PA.

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METHOD OF PIPING

VICTAULIC COUPLINGS *

Styles 77, 77-D for standard applications. Simple, fast to install—sturdy and reliable. Sizes ¾" to 30". Style 75 Light-Weight Couplings for light-duty applications. Sizes 2", 3", 4". Additional styles for cast iron, plastic and other pipes. Sizes through 60".

ROUST-A-BOUT COUPLINGS *

Style 99 for plain or beveled end pipe. Best engineered, most useful plain end joint on the market. Simple, husky — easy and fast to install. Takes strong bull-dog grip on pipe. Sizes 2" to 8".

VICTAULIC FULL-FLOW FITTINGS

Complete line of Elbows, Tees, Reducers, Laterals, etc. — to fit all Victaulic Couplings. Streamlined for top efficiency, easy to install. Sizes ¾" to 12".

VIC-GROOVER TOOLS

Handy, on-the-job grooving tools that do the job in half the time. Light weight, easy to handle — operate manually or from any power drive. Automatic groove position and depth. Sizes ¾" to 8".

*APPROVED BY:

Factory Mutual

New York City Board of Standards and Appeals, Cal. #413-53-SM.

Underwriters' Laboratories, Inc.

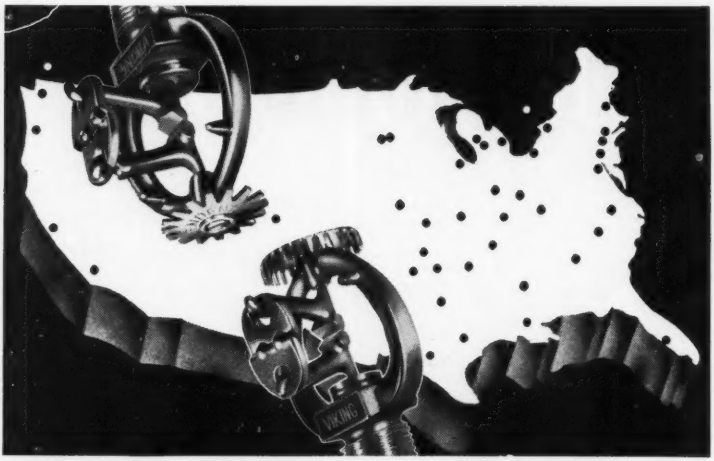
Proven for 26 years on both wet and dry Fire Protection Systems. Standard with most major sprinkler companies for bulk-run and cut-in piping. Victaulic Couplings are installed in *less than one-half the time* required for other standard pipe joints.

THE EASIEST WAY TO MAKE ENDS MEET

VICTAULIC

COMPANY OF AMERICA

P.O. Box 509, Elizabeth, N. J.



VIKING SPRINKLER FIRE PROTECTION

for any condition whatever it happens to be!

ATLANTA — Crawford & Slaten Co. BOSTON—Viking Automatic Sprinkler Co. BUFFALO—Viking Automatic Sprinklers, Inc. CHICAGO, MILWAUKEE — Viking Automatic Sprinkler Co. CINCINNATI, CLEVELAND, INDIANAPOLIS, LOUISVILLE —Viking Sprinkler Co. DALLAS, HOUSTON, JACKSON (Miss.), MEMPHIS, NEW ORLEANS, N. LITTLE ROCK, SAN ANTONIO, TULSA — Texas Automatic Sprinkler Co. DETROIT — Viking Sprinkler Co. GRAND RAPIDS — Viking Sprinkler Co. of Western Mich. HIGH POINT, N. C. — Viking Sprinkler Co. HUNTINGTON, W. VA.—C. W. Hutchinson, Inc. DECATUR (Ill.), DENVER, KANSAS CITY (Kan.), OMAHA, SAINT LOUIS — Walton Viking Co. LOS ANGELES, SAN FRANCISCO—California Viking Sprinkler Co. HILLSIDE (N. J.), NEW YORK, MANCHESTER (Conn.) — Viking Sprinkler Co. PHILADELPHIA, WASHINGTON (D. C.)—Viking Sprinkler Co. PORTLAND (Ore.), SEATTLE, VANCOUVER (B. C.) — Viking Automatic Sprinkler Co. ST. PAUL, MINNEAPOLIS—Hudson Viking Sprinkler Co. TAMPA — Florida Fire Sprinklers, Inc. TORONTO (Ont.) — Viking Automatic Sprinklers, (Canada) Ltd. WINNIPEG (Man.) — J. C. Davis, Ltd. HASTINGS (Mich.) — The Viking Corporation.

the VIKING corporation

HASTINGS, MICHIGAN

FEATURES YOU'LL LIKE

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about M&H HYDRANTS

These features are responsible for the popularity of M&H Hydrants:

1. Compression type valve opens against water pressure and remains closed should hydrant be broken off in traffic.
2. Large barrel and unobstructed waterway give high flow efficiency. Entire length of barrel is same inside diameter.
3. Dry top. Bonnet weatherproof. Operating threads and bearing lubricated through screw hole in operating nut.
4. Dry barrel. When main valve is closed, drain valves open. No danger of damage by freezing.
5. Operating parts are bronze or bronze bushed.
6. All moving parts are removable through barrel without excavating.
7. All parts of same-size hydrants are interchangeable.

M&H VALVE AND FITTINGS COMPANY
Anniston, Alabama

M&H PRODUCTS FOR WATER WORKS • FILTER PLANTS INDUSTRY • SEWAGE DISPOSAL AND FIRE PROTECTION

ANNOUNCING
THE NEW
STARGARD
Automatic Sprinkler

Approved by Factory Mutual Laboratories
Listed by Underwriters' Laboratories, Inc.

STAR SPRINKLER CORP.
Westmoreland and Collins Sts. — Philadelphia 34, Pa.
Licensees in all Principal Cities of the United States and Canada

FLAMMABLES OPERATIONS GUIDES

for Prevention of Fires from Unloading and Transferring through to Washing, Cleaning, Swabbing and Disposal

Equipment Selection Guide—a compact, concise illustrated chart containing a selection of various plant operations and the equipment suggested for fire prevention.
Easy to use—Standard 8½" x 11" note book size—Laboratory Approvals indicated.

Catalog of Equipment for Safe Storage, Handling and Use of Flammables—with supplementary sheets illustrating 27 different types of safety and operating containers with sketches showing applications and construction features. Contains a special description and illustration of the Protectoseal perforated metal double-wall fire baffle.

Drum Storage and Dispensing Catalog—gives complete explanation of the hazards and problems in delivery, storage and dispensing; describes and illustrates the various protective devices available and explains their application and use. Contains detailed specifications and gasket recommendations for various flammables.

Venting Fundamentals with Protectoseal Equipment—a new presentation from a functional viewpoint of vapor conservation venting, filling operations, tank car and tank truck loading and unloading, refueling operations—complete with specification data and venting air-flow charts.

Protectoseal provides the ONE complete source of APPROVED Fire Preventive Equipment for ALL Flammables Operations with over 100 specialized containers and devices for protection in every department and every activity all through the plant.

Engineering and Design Service—With the increased use of flammable solvents in production processes, there are undoubtedly some applications for which no special equipment is presently available. In such cases, consult with our sales engineers or contact factory direct. Our engineers and designers are interested in knowing of new applications and we are frequently able to produce new types of safety equipment which fit easily into the process.

Fill in coupon and attach to company letterhead.

West Coast Warehouse —Los Angeles, Calif.
In Canada— Safety Supply Co. Toronto.

THE PROTECTOSEAL COMPANY
1968 So. Western Avenue, Chicago 8, Illinois

Send "A Guide to Selection and Use of Protectoseal Equipment for Safe Storage, Handling and Use of Flammables." Also send the complete catalogs checked below:

☐ Safety Can Catalog ☐ Drum Storage Catalog ☐ Vent and Fitting Catalog containing Venting Fundamentals

Name_____ Title_____

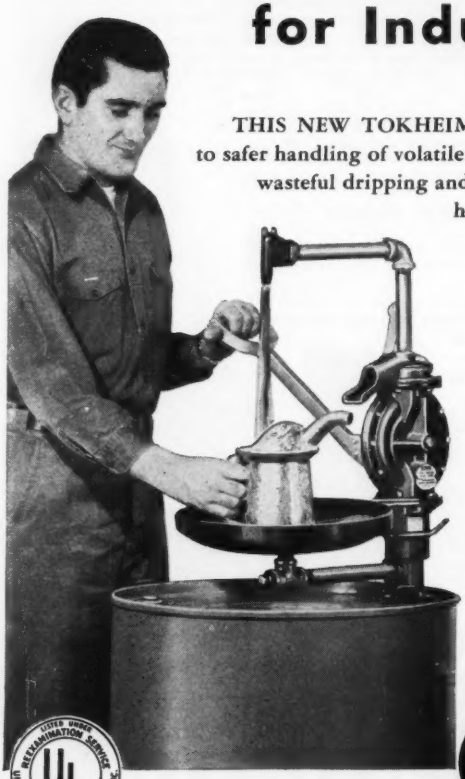
Company_____

Address_____

City_____ Zone_____ State_____

SAFER

liquid handling for Industry



THIS NEW TOKHEIM HAND PUMP contributes to safer handling of volatile liquids wherever used. Stops wasteful dripping and slippery floors. Reduces fire hazard and accidents common to other methods of liquid transfer. Approved for handling petroleum liquids —ideal for many others. Available in 22 different models for 'most any use— from pipe lines to drums, or underground tanks, with hose or spout outlets. Order from your dealer, your oil company, or your Tokheim representative.

Write factory for literature.

QUALITY TOKHEIM HIGH VACUUM HAND PUMPS

General Products Division

TOKHEIM CORPORATION

DESIGNERS AND BUILDERS OF SUPERIOR EQUIPMENT

1686 Wabash Avenue *SINCE 1901* **Fort Wayne 1, Indiana**

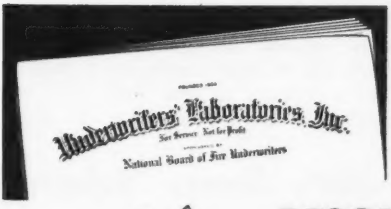
Factory Branch: 1309 Howard St., San Francisco 3, California

Canadian Distributor: H. Reeder, 205 Yonge Street, Toronto

First Fiberglass Panel Labeled by Underwriters'

Fire-Snuf® fiberglass panels, manufactured by the Resolite Corporation, are listed by Underwriters' Laboratories Inc., and each sheet or pane carries the Underwriters' label. Their flame spread rating of below 75 places them well within the "slow burning" category established by the Building Officials Conference of America.

These panels can be safely specified for such installations as skylights, partitions, windows and luminous ceilings . . . flame resistance is chemically locked into the polyester resins from which they are manufactured. They do not *support* combustion. For, while they will burn when a hot flame (such as a blowtorch) is applied directly to the surface, they are self-extinguishing and will snuff out as soon as the source of heat and flame is removed. Fire-Snuf retains all the best features of standard Resolite translucent panels including: shatterproof safety, high strength, stability and load bearing characteristics.



For additional information on Fire-Snuf including complete Underwriters' report consult the nearest Resolite distributor or contact:

RESOLITE Corp.
Zelienople, Pa.
Office and Warehouse, CHICAGO, ILL.
Export Office, HOUSTON, TEXAS
Distributors in principal cities, U.S. and Canada

RELIABLE SPRAY SPRINKLER

- Greater Coverage!
- Lower Ceiling Temperatures!
- Faster Cooling of Hot Fire Gasses!
- Better Fire Extinguishment with Less Water!
- Fewer Sprinklers Operating Adjacent to Fire Area!

Incorporating the new principle of water distribution, the Model "C" Spray Sprinkler is another example of Reliable's leadership in new product design. All Reliable Sprinkler Devices are the assurance of the ultimate in fire protection . . . and have been protecting life and property for over 30 years! Reliable Sprinkler Devices are distributed . . . installed and serviced by Reliable's chain of licensed representatives located throughout the United States, Canada and foreign countries. A Reliable representative is as near as your phone . . . Call him for a system designed to your specific needs!

Constant Fire Protection That's Always "Reliable"!

THE RELIABLE AUTOMATIC SPRINKLER CO. INC.

This is the type of fire that is

KILLED FAST BY

Nicerol

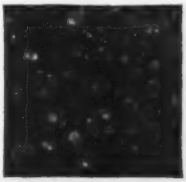
Foam Blanket—

AND WILL STAY DEAD

A dense blanket of adhesive, cohesive foam which actually follows the fire, stifles it, outlasts it and prevents flash-back—that's Nicerol, most widely used foam compound in the world.

Nicerol, with pH 6.8 to 7.3, ensures freedom from corrosion in equipment and storage drums. It does not form sludge. 3 gallons of Nicerol NLXX (3%) Foam Liquid with 100 gallons of water, fresh or salt, forms 1,000 gallons of foam.

It can cost you nothing to test Nicerol this way. Write the one word SAMPLE on your official stationery and we will send you, freight pre-paid anywhere in the U.S.A. or Canada a 5-gallon can of Nicerol NLXX (3%) for $20 C.O.D. (or please enclose draft). The $20 cost of this sample will be deducted from your first 100 gallons or larger order for Nicerol.



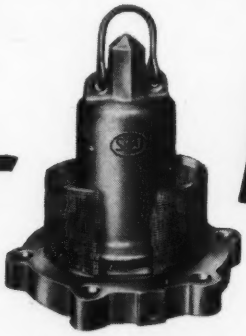
Photomicrograph X30, showing closely-knit bubble blanket of Nicerol foam, strongly cohestive, adhesive, outlasting the fire.

Full technicial and commercial details available from :

GEORGE REYNOLDS & ASSOCIATES, P.O. BOX 395, THORNWOOD, NEW YORK
THE GENERAL DETROIT CORP., P.O. BOX 263, DETROIT 32, MICHIGAN
THE GENERAL PACIFIC CORP., 8740 WEST WASHINGTON BLVD., CULVER CITY, CALIF.

Real Safety—

not just nominal!



S & J

The S. & J. Hydraulic Operator above is used to pump up hydraulic pressure to open hydraulic vales.

FUSIBLE PLUG
Tiny fusible plugs installed in hydraulic lines melt at 165° F., release hydraulic pressure and automatically close valves in case of fire during unloading.

When you specify S & J Hydraulic Safety Systems for your truck tanks, you get equipment that was conceived, engineered and built as Safety Equipment. It is not an assembly of miscellaneous valves, pumps, pipes and fittings, adapted to purposes of Safety.

It has Safety designed and built into it all the way. That's why, when you buy S & J Hydraulic Systems, you get what you pay for in full measure. There are other Safety Valve Systems in which Safety is purely nominal—rods can be bent so as to open the valves they are supposed to hold closed—valves whose packing glands leak gasoline and invite fires. Safety here is just Nominal—in name only.

If you are buying Safety for truck tanks of more than 4 compartments, you may even find the cost of the S & J Hydraulic Safety System lower than that of inferior mechanical valves.

If you're really serious about Safety—specify S & J—get everything you pay for in Safety, and then some.

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TULSA
Thompson Bldg

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6399 Wilshire Blvd

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CARACAS, Sanitas Sponza, C.A., Edificio Galipan
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Wheeco, Ltd., Works, Darlington, County Durham

ROCKWOOD WaterFOG SPRINKLER HEAD discharges a uniform pattern of WaterFOG *down into* flame space, bringing the heat absorbing efficiency of WaterFOG to sprinkler systems.

ROCKWOOD TYPE T WaterFOG HEAD used for special hazard fixed piping systems. A variety of fog patterns is available to provide the most efficient protection possible for special hazards.

Two enemies of fire

The Rockwood TU-57 WaterFOG sprinkler gives better distribution of water. It has a wide angle, medium velocity discharge that provides superior fire protection and limits transmission of flammable gases. It is recommended for use in all sprinkler systems.

The Rockwood Type T WaterFOG heads are versatile. By integrating T-Heads into special hazard systems, Rockwood's fire protection engineers can help you solve most any special hazard fire protection problem.

Both the Rockwood TU-57 Head and the T-Head offer positive protection against fires. Each is ideally suited to meet different requirements. Rockwood also makes six different piping systems for FOAM and FogFOAM with a variety of discharge devices. For complete information, send coupon.

ROCKWOOD SPRINKLER COMPANY

Engineers Water . . . To Cut Fire Losses

ROCKWOOD SPRINKLER COMPANY
1104 Harlow Street, Worcester 5, Massachusetts

Please send me full information on Rockwood Type T and TU-57 Sprinkler Heads.

Name.....*Title*.....

Company.....

Street.....

City.....*Zone*.....*State*.....

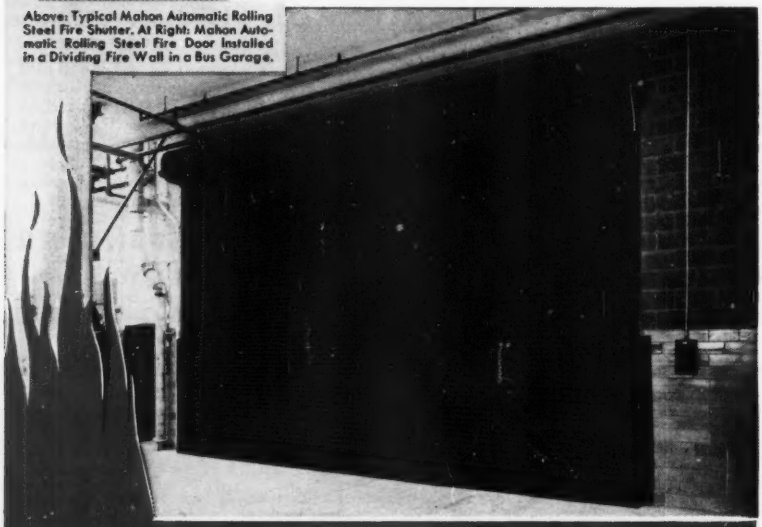
Automatic Rolling Steel
FIRE DOORS *and* WINDOW SHUTTERS
PREVENT SPREAD *of* FIRE!

You need good automatic fire doors in fire walls, corridors, and vertical shafts . . . in some cases automatic rolling steel window shutters are necessary to protect your building and its contents from fires which may originate in nearby buildings. Many, many cases are on file which confirm that timely action of automatic rolling steel fire doors and window shutters have confined a fire to its point of origin and permitted its being extinguished with comparatively small damage. Make a survey of your building now, and don't delay action. You will find a Mahon Automatic Rolling Steel Fire Door or Window Shutter to meet each of your requirements—all bear the Underwriters' Label. These automatic fire doors may be operated manually or mechanically in every day use. If a fire should break out while they are in the open position, the automatic mechanism will close the door, cutting off drafts and preventing the spread of the fire. See Sweet's Files for complete information, or write for Catalog G-55.

THE R. C. MAHON COMPANY
Detroit 34, Michigan • Chicago 4, Illinois

Manufacturers of Automatic Rolling Steel Fire Doors and Window Shutters.
Also Many Types of Standard General Service Rolling Steel Doors and Grilles, Insulated Metal Walls, and Steel Deck for Roofs, Floors and Partitions.

Above: Typical Mahon Automatic Rolling Steel Fire Shutter. At Right: Mahon Automatic Rolling Steel Fire Door Installed in a Dividing Fire Wall in a Bus Garage.



MAHON ROLLING STEEL FIRE DOORS and WINDOW SHUTTERS

FACTS about FIRES and Fire PROTECTION systems

1 out of every 7

Each year, serious fire strikes one out of every seven manufacturing firms in this country. Lives are lost. Equipment, buildings and *records* are destroyed. Inventories are in ashes.

43 out of every 100

Out of every 100 of these firms that merely lose their records as a result of fire, *43 never open* for business again.

9 out of 10

And that is all so unnecessary... because in 9 cases out of 10 no investment is required by Blaw-Knox to install the most effective means of protection against fire loss... a Blaw-Knox *Automatic* Sprinkler System. And the system pays for itself in a few years by savings in reduced insurance premiums.

"Little Joey Sprinkler" always on the job

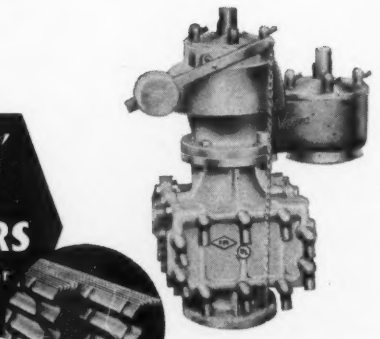
50th Anniversary BLAW-KNOX 1906-1956

BLAW-KNOX COMPANY

Automatic Sprinkler Department
829 Beaver Avenue, N. S., Pittsburgh 33, Pa.

LOW COST
FIRE & EXPLOSION PROTECTION
for FLAMMABLE LIQUID STORAGE

"Varec" WITH FLAME ARRESTERS in combination with your VENT VALVES



Flame Arrester Unit listed by UNDERWRITERS' LABORATORIES Approved by Associated Factory Mutuals Laboratories and other governing agencies.

Fig. No. 5800A Conservation Vent Unit consisting of VAREC Vent VALVE in combination with VAREC FLAME ARRESTER

You can rely on VAREC CONSERVATION VENT UNITS to provide full fire protection on your liquid storage at low cost. Protection against entry of flame through the venting device is certain when Varec Flame Arresters used. Protection against excessive pressure or vacuum is assured by the VAREC VENT VALVE. The combination unit gives you complete security against major hazards of flammable liquid storage. Average installation costs 1/10th of 1% of your investment in tank and products. Secure full details from your VAREC Representative or write factory.

NF-3

"Varec"

THE VAPOR RECOVERY SYSTEMS COMPANY

COMPTON, CALIFORNIA, U. S. A.

Cable Address: VAREC COMPTON USA (All Codes)

SELF-CONTAINED

PRESSURE-PACK

protects areas up to

416 sq. ft.

from damage by fire
in flammable liquid

- Manual or automatic operation
- Yearly recharging not necessary
- Easily installed without special tools

NATIONAL FOAM SYSTEM, Inc.

West Chester, Pa.

GRIMES

AUTOMATIC
Spray
SPRINKLERS

UPRIGHT
MODEL SSU

PENDANT
MODEL SSP

FIRE SPRINKLER SYSTEMS AND EQUIPMENT

Engineered for better protection

ALARM VALVES
WATER MOTORS
VALVE DEVICES
DRY PIPE VALVES
RETARD CHAMBERS
CIRCUIT CLOSERS
EMERGENCY CABINETS
TRIMMINGS
SPRINKLERS — ALL TYPES AND FINISHES
NEW! MODEL A GRIMES ACCELERATOR

Manufactured and Installed by

GRIMES DEVICES
ARE APPROVED BY
ALL INSURANCE
INTERESTS

RAISLER
SPRINKLER DIVISION

RAISLER CORPORATION, 129 Amsterdam Ave., New York 23
Licensees in all principal cities in the United States and Canada

A fireye Interlock System could have prevented this

THE RESULT OF ONE SLIP IN 15 YEARS OF PERFECT PROCEDURE!

Cost of New Boiler — $35,000...

Cost of Lost Production — Much More

For 15 years, a well-designed boiler and an experienced and competent operator — plus a standard type of burner safeguard — seemed enough for safety in this large manufacturing plant. Then came one of the slips that prove no human is infallible. The operator tried to light off a second burner from one already firing. The safeguard system failed to prevent an explosion that destroyed the boiler and shut down production for months.

With a Fireye interlock system, this kind of accident can't happen. *Firetron* "eyes" constantly monitor both pilot and main flame. Timers, interlocks, and shutoff valves automatically prevent improper procedure, every step of the way. And if the flame goes out during the firing period, Fireye shuts off fuel and sounds an alarm in 2 to 4 *seconds*.

Where fuel-burning safety comes first, Fireye is the first choice — and proved the world over. Write for free literature that will tell you why.

E A fireye

COMBUSTION CONTROL DIVISION

ELECTRONICS CORPORATION OF AMERICA

Dept. C26-4, 718 Beacon Street, Boston, Mass.

In Canada, write Electronics Corporation of America (Canada) Limited, Box 111, 98 Advance Road, Toronto 18.

ROLAGRIPS
for plain end pipe, 1½" to 12". No threading, grooving, flanging or welding.

fast, flexible, low cost sprinkler system couplings

GRUVAGRIPS
for jobs specifying ¾" to 14" grooved pipe. Double rib construction gives great strength with least weight.

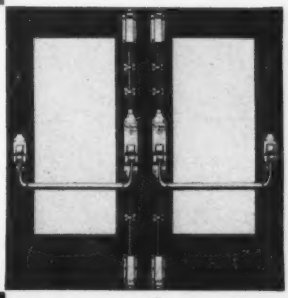
ROLAGRIPS and GRUVAGRIPS are listed for use in sprinkler systems by Factory Mutual and Underwriters' Laboratories. Their simple construction makes installation a snap. Just three parts — twin housing halves and synthetic rubber gasket — held by two bolts. Re-usable. ROLAGRIPS and GRUVAGRIPS are leakproof under working pressures to 1,000 psi, end pull to 102,000 pounds. They automatically absorb shock, vibration, deflection to 7°, expansion and contraction.

Write today for prices and new free illustrated couplings folder 55-F. Or see ROLAGRIPS and GRUVAGRIPS (and companion GRUVAGRIP FITTINGS) at your supply store.

GUSTIN-BACON MANUFACTURING CO.
210 West 10th Street **Kansas City, Missouri**

Get your exits

ready for increased traffic



Call in your

Von Duprin
"EXIT SPECIALIST"

● Increased production for your plant means more employes, more traffic, more need than ever for safe, dependable exits. Call in your Von Duprin "Exit Specialist" for a free survey of your exit requirements. From actual experience, he can recommend the right Von Duprin exit devices to give you the greatest safety and service. Von Duprin is the most complete line of approved exit devices. From this one line, you can meet *all* your present and potential exit hardware needs. If you don't know the name of your nearest "Exit Specialist," write Von Duprin.

FREE Reserve a showing of Von Duprin's 20-minute sound movie, "Safe Exit." Build a lively safety program around this interesting public service film. Write for a booking.

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Von Duprin Fire and Panic **EXIT DEVICES**

THE SAFE WAY OUT!

Send For This FREE Catalog!

. . . 28-page illustrated booklet contains factual information on methods of fire detection, fire prevention, fire control and fire extinguishment.

READ ABOUT

RATE-OF-RISE, FLAME, FLAME-SMOKE and VAPOR Detection

FIRE-FOG, AIR-FOAM, CO_2, DRY CHEMICAL Systems

SPECIAL HAZARD SYSTEMS APPLICATION CHART

ENGINEERED

SPECIAL HAZARD

FIRE PROTECTION

Automatic Sprinkler

CORPORATION OF AMERICA

Offices in Principal Cities of North and South America

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

Dept. S.H. — Box 360 — Youngstown 1, Ohio

Please furnish me with a copy of your Catalog 73—

"Engineered SPECIAL HAZARD Fire Protection."

Name.....

Title.....

Company.....

Address.....

City.....Zone.....State.....

AUTOMATIC FIRE ALARMS AUTOMATICALLY KEEP SMALL FIRES SMALL

First when seconds count!

Fire strikes and spreads so rapidly that any delay — even seconds — in notifying the Municipal Fire Department can be disastrous . . . might put you out of business permanently.

You can depend on a Gamewell Fire Alarm System to contact the Municipal Fire Department *immediately* and *automatically* when a sprinkler head goes off or an alarm box is pulled . . . no guesswork . . . no costly delays!

Easily added to your present sprinkler system, a Gamewell Fire Alarm System safeguards your personnel, your plant and your production. Get *complete* protection . . . write NOW for the name of your nearest representative.

THE GAMEWELL COMPANY
Chestnut St., Newton Upper Falls 64, Mass.

GAMEWELL

FIRE ALARM SYSTEMS

SAFETY ENGINEERED FOR YOUR PROTECTION

FLAMMABLE CHEMICAL STORAGE SAFEGUARDED BY GRINNELL SYSTEM

At the Bridesburg plant of the Rohm & Haas Company, Philadelphia, Pa., protection of stored alcohol and monochlorobenzene is entrusted to a foam system installed by Grinnell. In the event of fire, flame-smothering foam covers the manhole, the most hazardous part of the tank; at the same time building up a foam blanket in the dyked area at base of tanks to kill fire there.

Mechanical foam, one of many special Grinnell fire protection systems, is used for fire hazards involving flammable liquids . . . such as in tank storage of chemicals; oil and paint rooms; loading racks; creosote tanks; pump houses; and processing rooms. Mechanical foam operates by shutting off the oxygen from the flammable vapors — and by insulating against the heat of the fire. It is flexible and adaptable; floats on liquids, flows over and around obstacles, clings to solids.

Call on Grinnell for help with your fire protection problems. Grinnell engineers are trained to evaluate your property and to advise on the proper system for your hazard. With a full range of equipment and more than 85 years experience in fire protection work, you are assured of unbiased recommendations which will be fitted to your exact needs. Grinnell Company, Inc., 274 West Exchange Street, Providence, R. I.

There's a GRINNELL Fire Protection System for every fire hazard

Automatic spray sprinklers — wet pipe, dry pipe, and Simplex systems

Deluge spray sprinklers, rate-of-rise detection—Multitrol wet or dry pipe systems

Emulsion and vapor dilution extinguishment — Mulsifyre and ProtectoSpray Systems

Water spray for cooling, insulation, and controlled burning — ProtectoSpray systems

Mechanical foam blanket — ProtectoFoam systems

Carbon dioxide blanket — C-O-Two systems

Dry chemical systems

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